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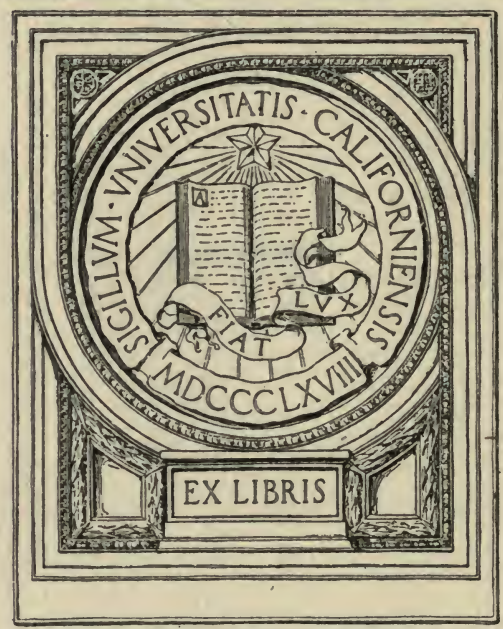
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TRENDS OF SCHOOL COSTS

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TRENDS OF SCHOOL COSTS

W. RANDOLPH BURGESS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN THE FACULTY OF PHILOSOPHY, COLUMBIA UNIVERSITY

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TRENDS OF SCHOOL COSTS

CHAPTER I

THE MOUNTING COST OF EDUCATION

Fifty years ago, in 1870, the United States made the first annual accounting of its school children. Through the agency of its newly created Bureau of Education, the National Government made the first of a series of annual reports setting forth the most important numerical facts with regard to its public schools.

The Increasing Number of School Children

This first accounting showed that there were about 4,000,000 children attending the public schools of the United States. Each year since that date the Bureau of Education has made a similar accounting of the school children, and the latest figures, for the year 1918, show that the school children have increased in number from 4,000,000 to more than 15,500,000. If the figures for the entire half century from 1870 to 1920 were complete, they would undoubtedly show that the children in average daily attendance have nearly quadrupled in number during that time.

This increase has been far more rapid than that in the total population of the country. While the entire population is about three times as great in 1920 as it was 50 years earlier, in 1870, the attendance in the public schools is nearly four times as great now as it was 50 years ago. It is noteworthy that this marked gain in the school population has been made despite the fact that the proportion of children to the whole population has been falling off slowly but steadily during the past 50 years. The explanation for the increase in school attendance, despite the gradual shrinkage in the proportion of children of school age, is to be found in the better enforcement of laws and regulations for compulsory attendance, and in the fact that children now remain in school more years than they used to. Each year somewhat larger numbers of children remain in school long enough to reach the upper grades and the high schools.

The figures showing the number of children in average daily attendance in the public schools of the country are given in Table 1, which also shows the total expenditures for the support of the schools each year. The data are from the Statistical Abstract of the United States for 1918, with the exception of the figures for the last two years of the series. The data for 1918 are presented through the courtesy of the United States Bureau of Education from the Biennial Report in process of compilation but not yet published (March, 1920). The figures for 1917 are estimated from those for 1916 and 1918.

TABLE 1.—AVERAGE DAILY ATTENDANCE AND ANNUAL EXPENDITURE IN PUBLIC SCHOOLS OF THE UNITED STATES. 1870 TO 1918

Year	Thousands of children in average attendance	Thousands of dollars expended for education
1870	4,077	$63,397
1871	4,545	69,108
1872	4,659	74,234
1873	4,745	76,238
1874	5,051	80,054
1875	5,248	83,504
1876	5,291	83,083
1877	5,427	79,440
1878	5,783	79,083
1879	5,876	76,192
1880	6,144	78,095
1881	6,146	83,643
1882	6,331	88,990
1883	6,652	96,750
1884	7,056	103,213
1885	7,298	110,328
1886	7,526	113,323
1887	7,682	115,784
1888	7,907	124,245
1889	8,006	132,540
1890	8,154	140,507
1891	8,408	147,495
1892	8,561	155,817
1893	8,837	164,171
1894	9,263	172,503
1895	9,549	175,809
1896	9,781	183,499
1897	10,053	187,682
1898	10,356	194,293
1899	10,328	200,155
1900	10,633	214,965
1901	10,715	227,466
1902	11,064	238,262
1903	11,053	252,804
1904	11,318	273,216
1905	11,482	291,617
1906	11,712	307,766
1907	11,926	336,898
1908	12,154	371,344
1909	12,685	401,398
1910	12,827	426,250
1911	12,872	446,727
1912	13,302	482,887
1913	13,614	521,546
1914	14,216	555,077
1915	14,965	605,461
1916	15,359	640,717
1917	15,454	702,197
1918	15,549	763,678

In Diagram 1 the irregular line presents in graphic form the data of the second column in Table 1. It shows how the children in average daily attendance have increased during the period from 1870 to 1918. Running through the irregular line there is a straight line showing the general trend of this increase. This

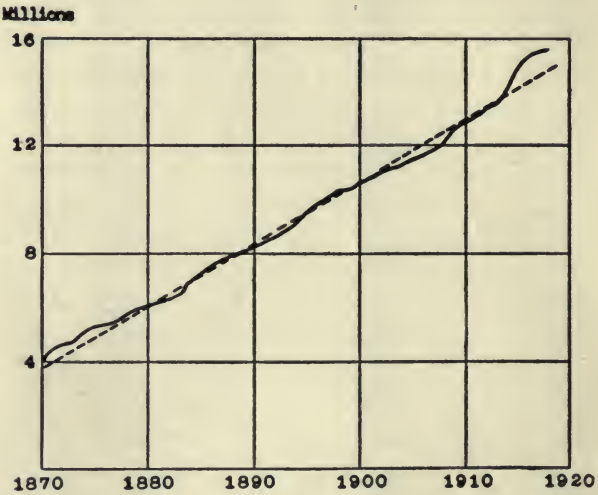

Diagram 1.—Average daily attendance at public schools in the United States. 1870 to 1918

trend line is the one which most accurately represents the general trend of the points which make up the irregular line.

Since trend lines will be used throughout the discussions which follow, it is worth while to consider them with some care at this point. The straight line

in Diagram 1 is no mere approximation. It is a graphic representation of a secular or long distance trend as distinguished from seasonal, or annual, or short time variations. It is the line which most accurately expresses the general direction of an irregular series of points.[1]

The trend of average daily attendance in the public schools, as represented by the line, begins in 1870 with 3,853,720 pupils in attendance, and increases 228,470 each year until it reaches the high point of 14,820,280 in 1918. The annual increase is nearly 6 per cent of the initial number of children. To be exact, it amounts to 5.929 per cent.

The Increasing Cost of Education

In the third column of Table 1 are figures showing the total cost of education in the public schools each year. They show that the expense of schooling has increased far more rapidly than the number of children. While pupils have been increasing from about 4,000,000 to nearly 16,000,000, the expenditures have gone from $63,000,000 to $764,000,000. The number

[1] A secular trend is determined by the method of least squares. It may be defined as a line such that the squares of the deviations from it are less than they would be from any other line. It is the "regression" line familiar to students of correlation. If one were to compute in the present case the coefficient of correlation between the years elapsed from 1870 to 1918 and the children in average daily attendance, and then find the regression line based on the subject, or time, series, the result would be what is here termed the trend line. The computation of this particular trend is shown in detail in Appendix I, and the same method has been followed in computing the other trend lines used in this volume.

of children has quadrupled, but the number of dollars spent for their schooling has gone up more than twelve-fold. At the beginning of the period, each year of schooling cost about $15 per child, but at the end of the period it cost nearly $50.

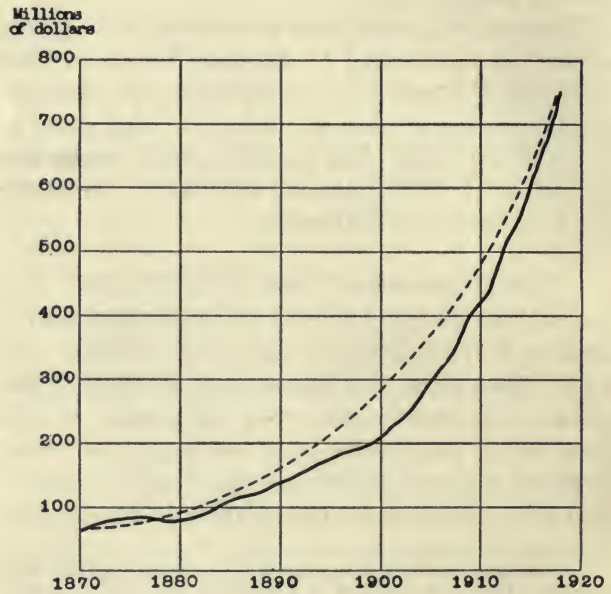

Diagram 2.—Annual expenditures for public education in the United States. 1870 to 1918

The progress of this increasing expenditure is shown in graphic form in Diagram 2. Here the irregular line shows the actual money expenditures each year, and the smooth curved line shows their general trend.

This diagram differs fundamentally from Diagram 1 because the facts are different in nature. Here it is impossible to present a straight line showing the general trend of the series because the trend is clearly a curve which becomes increasingly steep as the years pass by. In this case the trend line is a curve joining a series of points so placed that each is a little more than five per cent farther from the base line than its predecessor.[1]

Trends of Attendance and Cost

Diagram 3 shows in comparison the straight trend line of increasing attendance and the curved trend of increasing cost. They both start at the same point in 1870, and this point is arbitrarily taken as 100 per cent. It will be remembered that at that time the education of approximately four million school children cost about $63,000,000. During the 48 years that have followed the children in attendance have increased almost steadily at the rate of just less than six per cent per year over their original number. The exact rate has already been given as 5.929 per cent.

During the same period of time the cost of educating the children has gone forward at a constantly

[1] This curve was made by finding the logarithm corresponding to the expenditure of the first year of the series and that corresponding to the expenditure in the last year. The difference between these two logarithms was found and divided by the number of steps in the series. This difference was added to the logarithm of the first number once for the second year in the series, twice for the third year, three times for the fourth year and so on until it had been added 48 times. The numbers corresponding to these new logarithms are the points of the curve.

accelerating rate. Each year's expenditures have tended to be something more than five per cent greater than those of the preceding year. The exact figure is 5.337 per cent. The children have increased in arithmetical progression, but the expense of

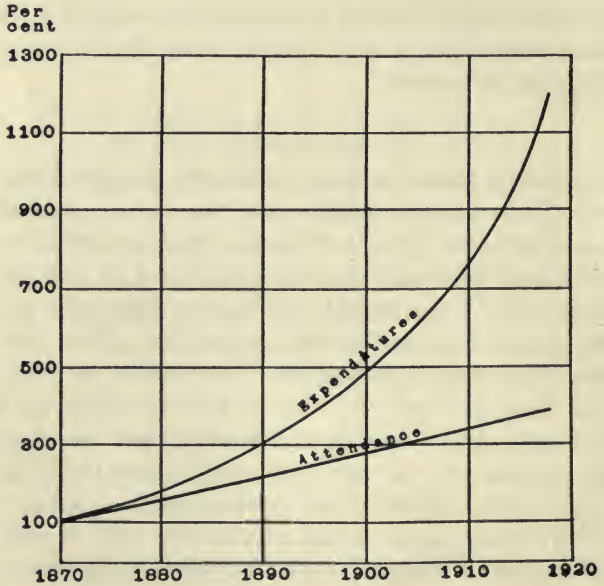

Diagram 3.—Trends of average daily attendance and expenditures, 1870 to 1918, in per cents of figures for 1870

schooling them has increased in geometrical progression. These conditions have their exact counterpart in ordinary financial practice. The children have increased precisely as would a sum of money at

simple interest in which the annual increment is a fixed percentage of the original amount. The expenditures have increased at compound interest, and the annual increment has been a percentage of all the previous increments plus the original base.

It is further noteworthy that there is no present evidence of any tendency on the part of the expenditures to fall off. It is probable that if the data were available for 1919 and 1920 the curve of expenses would be found to continue its upward tendency with greater rapidity than in any previous years.

The situation may be summarized to this point by noting that the children attending public schools have, for half a century, been increasing more rapidly than the population, that the expense has been increasing far more rapidly than the children, and that the rate of expenditure is itself increasing in a constantly accelerating manner.

An Analysis of Expenditure

Considerably more than one-half of all school expenditures go to pay the salaries of teachers and other school officers. Of $764,000,000 spent for school purposes in the United States in the school year 1917–18, the sum of $436,000,000, or 57 per cent, was paid as salaries to superintendents, principals, and teachers, and an additional seven per cent as wages to janitors and engineers. Next to salaries and wages the largest object of expenditure was new buildings and equipment usually designated as outlays, involving $119,000,000, an amount equal to nearly 16

per cent of the total for all purposes. Taken together these two items constitute nearly four-fifths of the school budget of the country. No other single item of expenditure approaches either of them in size. Next in order come fuel, water, and light.

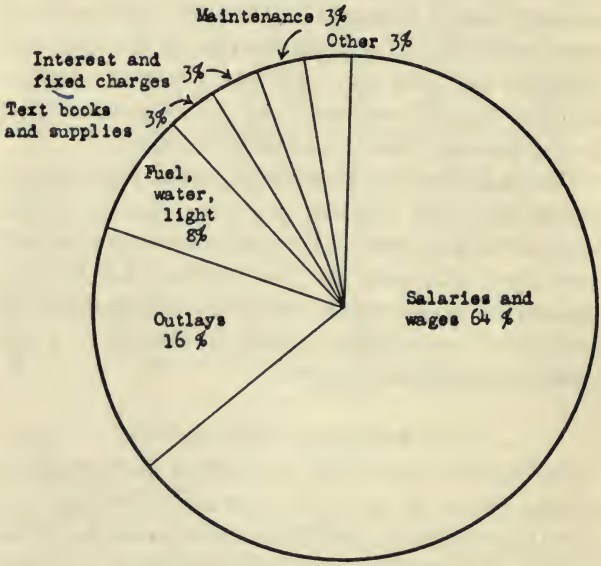

Diagram 4.—Per cents different items were of total school expenditures in the United States in the year 1917–18

The comparative size of the more important expenditures is shown in Diagram 4 in which the segments of the circle are proportional to the per cents which different items of expenditure were of the total spent for schools in the United States during the

school year 1917–18. The percentages are taken from advance sheets of the biennial report of the Commissioner of Education for the years 1917 and 1918. The very large proportion of all expenditures which was devoted to the two items of salaries and new buildings may fairly be taken as typical of educational practice in this country from the time public schools were organized. Reports of the Commissioner of Education carry the figure for teachers' salaries alone back to 1870 when they constituted 60 per cent of all expenditures, and the figure for outlays back to 1890 when buildings were nearly 19 per cent of the total budget.

In view of the absorption of so large a proportion of all school expenditures by the two objects, salaries and new buildings, and in view of the scattering of other expenses among so many and so varied types, any account of trends of school costs must devote itself largely to a discussion of teachers' salaries and the cost of the construction of buildings. Succeeding chapters of this book will deal with these two elements of school cost at greater length.

Summary

1. The population of the United States is in 1920 about three times as great as it was in 1870, 50 years ago.

2. The number of children in attendance at public schools is nearly four times as great as in 1870.

3. The amount spent for public schools is more than 12 times as great as it was in 1870.

4. School costs are advancing at a constantly accelerating rate. Each succeeding year shows a greater increase in the rate of expenditure.

5. Salaries and new buildings absorb four-fifths of all school expenditures. Other costs are scattered among many minor items.

6. A discussion of trends of school costs must be largely devoted to teachers' salaries and the cost of buildings.

CHAPTER II

INDEX NUMBERS FOR TEACHERS' SALARIES

In the year 1841 women teachers in country schools were receiving a salary of about two dollars and fifty cents for each week they taught. This salary included the value of the board which many of them received as a part of their compensation. In actual cash they received about one dollar and twenty-five cents a week. For the period of 80 years, from that time until the present, there has been a practically continuous rise in the salaries of these teachers.

The course of this increase is shown in Diagram 5. The curved line shows the actual weekly salaries, year by year, while the straight line shows the general trend computed by the same method as that used in Diagram 1 in the first chapter. Salaries rose gradually until the latter years of the Civil War when a rapid rise began, reaching its peak in 1875. In the period of financial depression which marked the closing years of that decade salaries fell away somewhat, but the gains that had been achieved were very largely retained. From 1880 until 1900 salaries continued on very much the same level with slight increases, but at the beginning of the new century

they started to climb to the present high point. During the 80 years a gain of about 600 per cent was made or, to put it another way, weekly salaries of women country teachers are now seven times as large as in 1841.

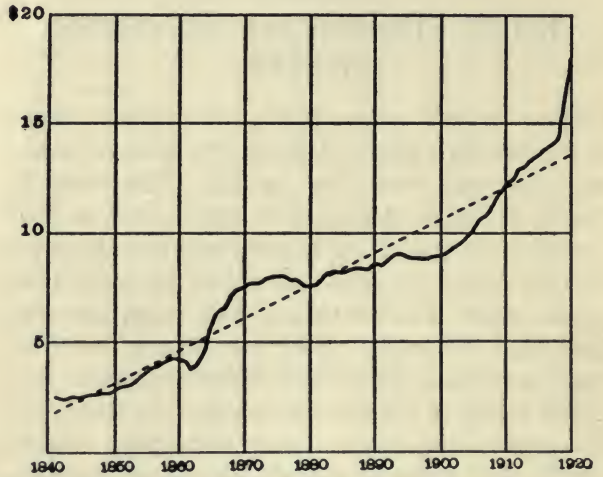

Diagram 5.—Weekly salaries of women teachers in rural schools. 1841 to 1920

The Method of the Index Number

The method used in computing these figures for the salaries of country teachers is that of the index number. It is desirable to comment at this point on the characteristics of the method because it will be used elsewhere throughout the book to measure the trends of wages and of prices. The index number, as

a statistical device, is especially adapted to this particular purpose. The method of procedure in this instance was to secure and tabulate the figures for the average weekly salaries of women teachers in twenty rural counties. These figures were fortunately available in the reports of the Superintendents of Public Instruction, or similar state officers, in ten different states.[1] Figures were used from the following counties: Barnstable and Franklin, Massachusetts; Carroll and Grafton, New Hampshire; Windham and Tolland, Connecticut; Adams and Tioga, Pennsylvania; Noble and Orange, Indiana; Gallatin and Greene, Illinois; Green and Calumet, Wisconsin; Boone and Bremer, Iowa; Brown and Butler, Kansas; and Merced and Shasta, California. These counties were selected because they were predominantly rural in character with no large centers of urban population, and also because the figures for them were available for long terms of years.

The same counties were used over the entire period of 80 years giving 20 quotations for each year except for a few years at the beginning and end of the period when a somewhat smaller number of quotations was available.[2] To secure the index number, a simple

[1] The figures are usually recorded as average monthly salaries. Monthly salaries were divided by four to give a figure for weekly salaries for weeks actually worked on the basis of 20 school days to the month.

[2] At both the beginning and end of the period it was necessary to resort to the method of relatives in order that the beginning of a new series or the termination of an old series might not affect the magnitude of the index number. This method expresses each measure as a per cent of a measure for

average was taken of the figures from the twenty counties for each year. Because of the constant use of the same counties any change which appeared in the series from year to year was due, not to a change in the number or kind of quotations, but almost certainly to some real change in the level of teachers' salaries.

This, in fact, is the fundamental characteristic of the index number. In the situations where a complete periodical census is not possible the index number gives a measure of changes from period to period by selecting quotations representative of large groups and drawing its quotations each year from the same sources. The method has been recognized in statistical usage for more than 150 years. It has more recently become familiar to the public through the

some other year in the series. These per cents are then averaged to give an index in terms of a percentage increase or decrease over the year taken as a point of departure. In this instance, the percentage was again reconverted into an average weekly wage. Only in a few cases have relatives been used in the compilation of the index numbers in this study. The relative is regularly used in computing index numbers where the quantities to be measured are of different orders of magnitude and have, therefore, to be reduced to a common denominator. Each is then expressed as a per cent of the figure for some convenient year taken as a base. In the case of teachers' salaries each of the indexes used in this study is made up of quotations of the same general magnitude. Hence it was not necessary to use relatives. This is a distinct advantage as the usefulness of the relative is limited by the fact that it can only be interpreted in terms of the year taken as a point of origin. Hence index numbers taken from different points of origin cannot be compared without converting them to the same base. Furthermore, the method of relatives may give undue weight to increases in the smaller quotations of a group of measures.

publication of index numbers for the price of food by the United States Bureau of Labor Statistics, and in financial circles through the use of index numbers to show the rise and fall of stock prices.[1]

The Aldrich Report

The index number has also been widely used to measure the trend of wages. A notable example of this use is the special report of the Committee on Finance of the Senate, *On Wholesale Prices, on Wages, and on Transportation*, published in 1893. The report is generally known as the "Aldrich Report" since Senator Nelson W. Aldrich was chairman of the sub-committee charged with the study. The statistician directing the investigation, Dr. Roland P. Falkner, used the index number as a method for determining the trend of prices and wages in a great many kinds of industries and occupations for the years from 1840 to 1891. Dr. Falkner made, in this report, the first attempt to construct an index number for teachers' salaries. He secured from Dr. W. T. Harris, at that time United States Commissioner of Education, quotations for teachers' salaries from the cities of St. Louis, Boston, Cincinnati, and Baltimore, and from the rural counties of Barnstable and Franklin, Massachusetts. By converting these figures into relative percentages of the amounts for the year 1860 he constructed index

[1] The fullest and most authoritative account of index numbers is a treatise prepared by Dr. Wesley C. Mitchell, *The Making and Using of Index Numbers*, published in Bulletin number 173 of the United States Bureau of Labor Statistics, July 1915.

numbers covering a period of 52 years. In spite of the inadequacy of the data[1] at Dr. Falkner's command the results show in their general trend a close similarity to the figures for the earlier years of the indexes presented in this report. It is believed that Dr. Falkner's work represents the only attempt which had been made up to this time to apply the technique of the index number to determining the trend of teachers' salaries.

Four Index Numbers for Teachers' Salaries

In the endeavor to make the index numbers presented in this study adequate measures of salary trends an exhaustive search was made of state school reports which have been published in the past 85 years, and to a somewhat more limited extent of city reports as well.[2] From these reports it has been possible to se-

[1] The value of Dr. Falkner's findings is limited, in the first place, by the number of quotations. Four cities and two rural counties are not a sufficiently large sampling to give wholly typical figures. With so few figures the curve is unduly influenced by what may be chance variations in a single quotation. In the second place, salary schedules rather than actual salaries paid were used for the cities, and schedules, as Dr. Falkner recognized, are subject to so many varying conditions as to amounts of training or experience required for a given rating that they are an uncertain basis for computing trends. In the third place, the figures for Barnstable and Franklin counties for the early and later years are not on a comparable basis since, in the early period, they are exclusive of board and later inclusive of board. As the early Massachusetts reports give both figures the error is one of incorrect compilation for which Dr. Falkner was not responsible.

[2] The writer has had access to the exceptionally complete collection of these reports in the library of Teachers' College, Columbia University.

cure the figures for the construction of four index numbers of teachers' salaries, each one of them derived from as many as 20 quotations during the major part of the 80 year period through which the index numbers are carried. The index numbers are shown in Table 2.

The four columns show for each year from 1841 to 1920[1] the average weekly salaries of women teachers in rural and city schools, and of men teachers in rural and city schools. While the averages include salaries of principals and supervisors as well as high and elementary school teachers, the levels of the index numbers are mainly determined by the larger numbers of elementary school teachers. The counties from which figures were secured for the index number for women teachers in rural schools have been enumerated on page 27. Figures from the same counties were used for the salaries of men teachers. For both men and women city teachers figures were secured from the following cities: Boston, Springfield, and Worcester, Massachusetts; Hartford, New Haven, and Stamford, Connecticut; Detroit and Grand Rapids, Michigan; Altoona, Harrisburg, and Reading, Pennsylvania; St. Louis and Kansas City, Missouri; Beloit, Milwaukee, and LaCrosse, Wisconsin; Cincinnati, Cleveland, and Columbus, Ohio; Baltimore, Maryland; and Manchester, New Hampshire. For women teachers figures from Concord, New Hampshire were also used. Quotations for the most recent years were

[1] The accepted practice of designating the figures for the school year by the year of its termination has been followed. For example the figures quoted in the table for 1841 are for the school year 1840–41.

supplied through the courtesy of the school officers of the different states and cities concerned. For the year 1920 these were in some degree in the nature of estimates.

TABLE 2.—AVERAGE WEEKLY SALARIES OF TEACHERS. 1841 TO 1920

Year	Rural		City	
	Men	Women	Men	Women
1841	$4.15	$2.51	$11.93	$4.44
1842	4.07	2.43	11.97	4.49
1843	3.99	2.45	12.04	4.36
1844	3.87	2.48	12.21	4.27
1845	3.87	2.51	11.88	4.09
1846	4.03	2.53	11.53	4.18
1847	4.09	2.61	11.81	4.27
1848	4.22	2.69	12.33	4.40
1849	4.23	2.72	13.11	4.54
1850	4.25	2.89	13.37	4.71
1851	4.43	2.95	14.10	4.87
1852	4.53	2.96	14.55	4.94
1853	4.73	3.13	15.55	5.23
1854	5.12	3.28	15.75	5.42
1855	5.77	3.65	16.80	5.79
1856	6.07	3.85	16.76	6.10
1857	6.48	4.03	17.61	6.59
1858	6.64	4.19	18.61	6.93
1859	6.42	4.27	18.30	7.16
1860	6.28	4.12	18.56	6.99
1861	6.30	4.05	18.07	6.91
1862	6.00	3.82	17.81	6.80
1863	6.31	4.01	18.19	6.95
1864	7.86	4.92	20.78	7.67
1865	9.09	5.99	23.15	8.57
1866	9.38	6.45	26.26	9.51
1867	10.04	6.54	29.76	10.40
1868	10.40	7.16	31.59	10.81
1869	10.76	7.37	32.62	11.07
1870	10.88	7.53	35.42	11.88
1871	11.11	7.66	35.85	11.43
1872	11.09	7.73	34.81	11.79
1873	11.61	7.84	35.65	12.34
1874	11.80	8.00	36.14	12.46
1875	11.46	8.00	36.63	12.69
1876	11.03	7.96	35.50	12.74
1877	10.89	7.80	34.31	12.78
1878	10.54	7.80	32.39	12.65
1879	10.18	7.54	30.22	12.53
1880	9.73	7.46	31.36	12.20

TABLE 2.—(*Continued*)

Year	Rural		City	
	Men	Women	Men	Women
1881	$9.98	$7.63	$31.85	$12.29
1882	10.23	7.88	31.94	12.21
1883	10.60	8.16	32.11	12.56
1884	10.96	8.16	32.53	12.88
1885	10.95	8.23	33.15	13.24
1886	11.06	8.26	32.35	13.09
1887	10.83	8.39	32.40	12.95
1888	11.08	8.36	32.38	12.79
1889	11.25	8.40	32.28	12.91
1890	11.30	8.55	32.62	13.16
1891	11.21	8.51	32.62	13.33
1892	11.76	8.78	33.62	13.39
1893	12.10	8.99	33.26	13.43
1894	11.89	8.99	33.01	13.34
1895	11.70	8.91	31.63	13.40
1896	11.86	8.81	31.99	13.50
1897	11.79	8.86	31.51	13.88
1898	12.05	8.83	31.67	13.65
1899	12.04	8.93	31.89	13.96
1900	12.13	8.93	31.54	13.88
1901	13.19	9.05	32.08	13.95
1902	13.34	9.31	32.87	14.20
1903	13.06	9.52	33.28	14.53
1904	13.88	9.91	32.97	14.66
1905	14.39	10.15	33.79	14.86
1906	14.84	10.61	33.24	15.20
1907	15.09	10.71	34.16	15.95
1908	15.53	11.05	35.51	16.20
1909	16.31	11.64	35.83	16.88
1910	17.11	12.15	36.42	17.38
1911	17.44	12.33	36.42	17.86
1912	17.22	12.85	36.06	18.30
1913	17.75	13.09	35.33	18.84
1914	18.45	13.37	34.96	20.51
1915	18.61	13.63	37.15	21.06
1916	18.27	13.90	37.88	21.82
1917	19.03	14.07	36.78	22.34
1918	20.75	14.35	40.06	23.90
1919	23.66	15.84	48.62	28.57
1920	26.75	17.68	60.61	35.61

The salary received for each week the teacher actually taught rather than the annual salary has been used for a number of reasons. In the first place, the

records in the old state reports were in terms of average monthly wages. In many cases the facts were not available on the basis of which to convert the figures into annual salaries.

In the second place, the wage received for the period actually worked is a fairer measure in the early years than the annual salary because, with a very short school year, almost every teacher engaged in some other occupation as well. This may still be said of many country teachers.

In the third place, the weekly wage offers a better basis of comparison with the pay of other workers. In the occupations for which wage figures are available it is practically impossible to compute annual wages because of the widely varying number of weeks worked from year to year, and the lack of recorded information about such employment. The fact that, in the long run, there is no great disparity between the number of weeks a year a school teacher works and the number a skilled artisan or laborer is employed will be discussed in a later chapter.

For one possible element of error in the early figures it has been necessary to make careful allowance. In the early days, and in some rural counties until comparatively recent times, it was customary to board the teacher around. Part of his or her compensation consisted of the board received. In many of the state reports salary figures were reported including the value of board received; in others the value of board was given separately; in nearly all it was possible to find some indication of what correc-

tion should be made. It is believed that the index numbers as they stand make proper allowance for compensation received in this form by teachers.

Trends of the Four Index Numbers

In order to bring out the similarities of, and differences between the four different index numbers of teachers' salaries, the figures in Table 2 are made the basis of Diagrams 6 and 7. Diagram 6 repeats the curve of Diagram 5, and shows beside it the course of the salaries of rural men teachers. Diagram 7 shows the salaries of city men and women teachers. On each of the curves the trend or regression line is drawn to show the general movement of the index number over a period of 80 years.

The diagrams show at once the general similarity between the movements of the salaries of different types of teachers. All have a steady trend upward. All made large gains just after the Civil War followed by a considerable levelling off. All made appreciable gains since 1900 and sharp advances in the last two or three years.[1]

A careful inspection of what occured in all of the salary curves at the time of the Civil War is interesting because of its analogy with conditions today.

[1] In the general similarity of movement of the four curves we have excellent substantiating evidence of the reliability of the methods employed in the construction of the indexes. That figures taken from such varied sources should show so close agreement is a demonstration that we are getting a true index of salary trends. Similar confirmation is found in the smoothness of the curves. Chance variations have evidently been nullified in large measure.

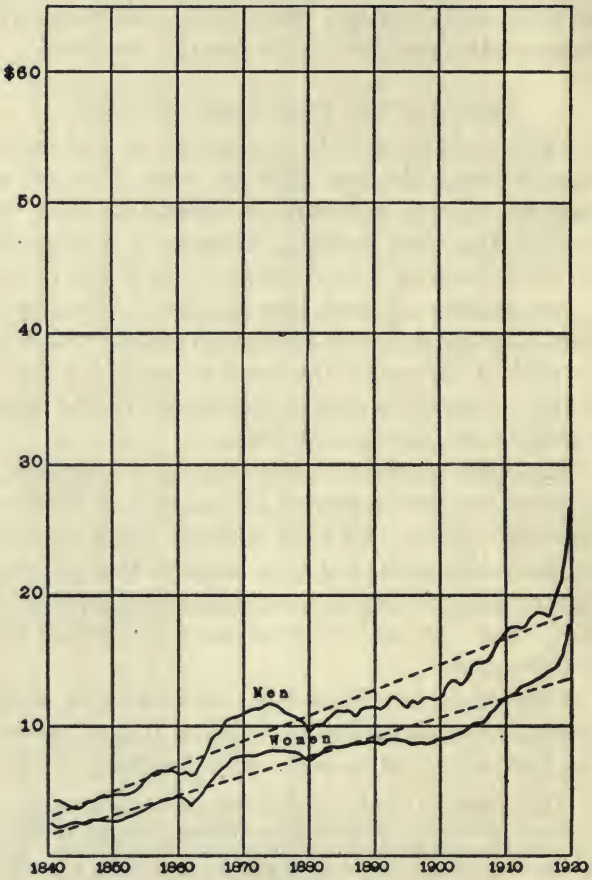

Diagram 6.—Weekly salaries of men and women teachers in rural schools. 1841 to 1920

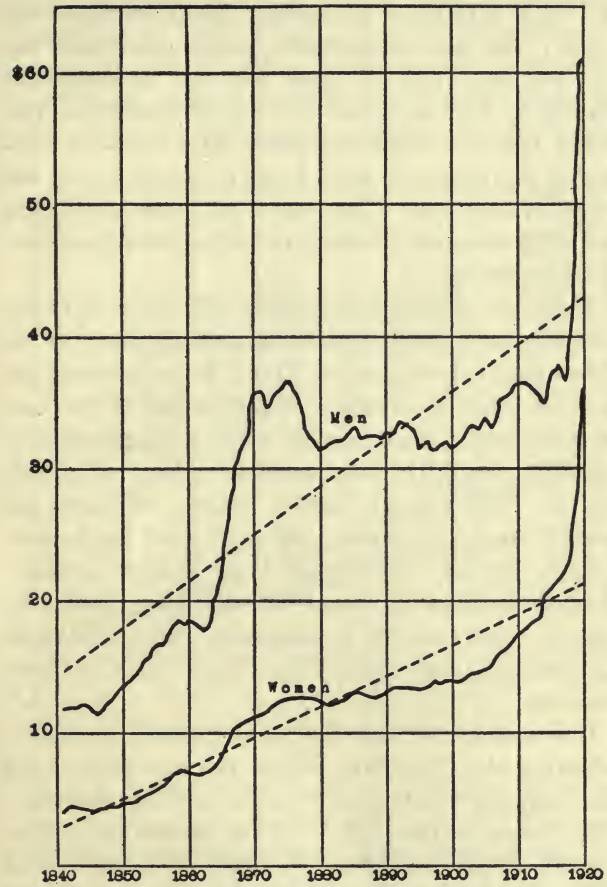

Diagram 7.—Weekly salaries of men and women teachers in city schools. 1841 to 1920

Teachers' salaries did not begin to rise until the war had been in progress two years. Then they rose but slowly. The more important changes came after the war was over, and the peak was not reached until practically 10 years after the close of hostilities. The salary curves during the years 1917 and 1918 repeated this failure to show rapid increases during the period of hostilities. The very rapid increases of 1919 and 1920 are again showing a tendency to repeat previous experience.

There are certain outstanding differences between the different curves. Salaries of men in cities are far higher than other salaries. This is to be expected because in cities a considerable proportion of the men are teaching in high school, while a comparatively small per cent of the total women teachers are in high schools. The second highest figures are those for women teachers in cities, although male teachers in country schools were paid very similar salaries. Women teachers in rural schools come last. In general, men receive considerably higher salaries than women, and city teachers higher than country teachers.

It is worthy of note that after the rise in salaries following the Civil War period the curves for both kinds of men teachers show a distinct and considerable downward reaction, while the women experience very slight recession from the high point reached in 1875. A natural explanation would appear to be that men's salaries in the teaching profession were at that time in closer competition with salaries in the busi-

ness world than were women's. Hence when the business depression of the second half of the decade beginning in 1870 drove down the general level of wages the salaries of men teachers went lower as well.

There is another striking difference between men's and women's salaries in the years from 1910 to 1917.

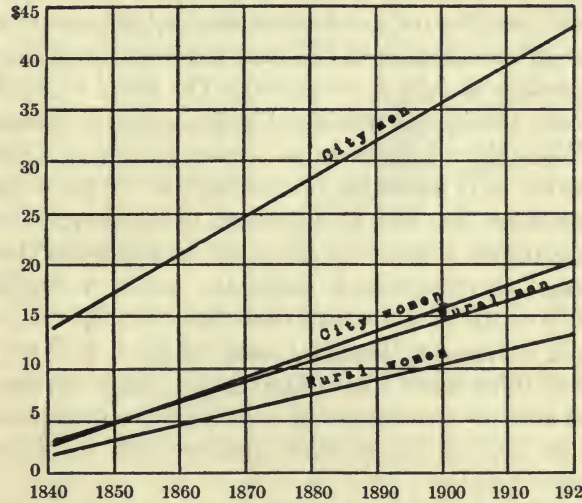

Diagram 8.—Trends of weekly salaries of men and women teachers in rural and city schools. 1841 to 1920

During these seven years the salaries of women teachers show a rapid and steady increase. The curves for the salaries of men teachers, on the other hand, are broken by two depressions and make little advance.

Diagram 8 is made by plotting on one background the trend lines from the four diagrams just presented.

This is done in order to make clear some of the characteristic differences in the general movement of the four curves.

The salaries of city men teachers started at a level nearly five times as high as any of the other groups. Their gains were sufficient to keep them well in the lead. The salaries of city women teachers started lower than those of men in rural schools, but passed the men in the course of a very few years and continued thereafter to gain more rapidly. The trend for rural women teachers is considerably below all the others.

While this diagram shows the actual trends of the salaries, it is deceptive in one respect. It gives the impression that city men teachers made the greatest proportional increase in the wage received and that women in rural schools made the least. A careful study of the diagram will show that exactly the reverse is the case. The final salary of the men is only about three times their initial salary, while the general level of the salaries of country women teachers at the close of the 80 years is about eight times the early figure.[1]

Percentage Increases 1841 to 1920

Diagram 9 is inserted to make clear the relative increases in the trend of the salaries of the four kinds

[1] The reader should be cautioned at this point to observe that the lines in Diagram 10 do not indicate, at the end points especially, the salaries actually received, but the salaries that would have been received if the gains made had been distributed evenly over the entire period of 80 years. A re-examination of Diagrams 6 and 7, will make this clear.

of teachers. Here the trend or regression figures are plotted, not at their face values, but as per cents taking the trend figure for the year 1841 as 100 per cent. On this basis it is evident that the salaries of

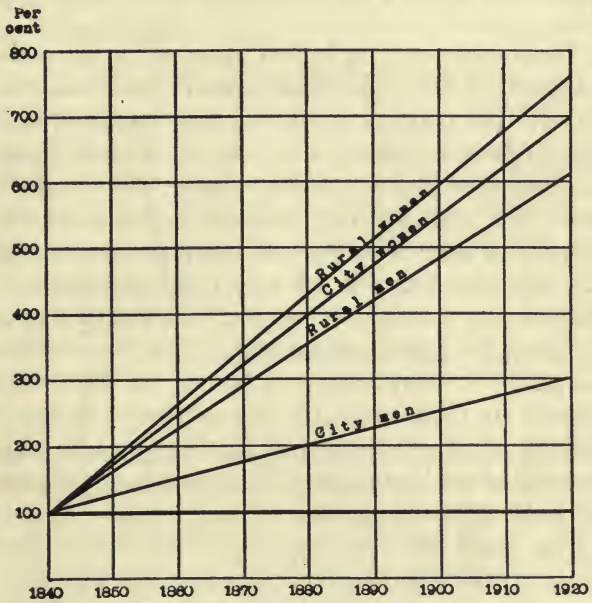

Diagram 9.—Trends of teachers' salaries in per cents of the figures for 1841

women country teachers have had the highest percentage increase, rising to nearly 800 per cent of the 1841 figure. Women city teachers in second position are closely followed by men rural teachers. Men city teachers, on the other hand, have had salary in-

creases relatively less than half as great as men teachers in rural schools and less than one-third as great as women teachers in cities. In general, women's salaries have shown a larger relative increase than have those of men, and country teachers larger than city.

These facts may be looked upon as, in the main, evidences of wholesome tendencies in American education. The position of the woman teacher in 1840 was far from desirable. She was in the main a subordinate assistant in schools wholly controlled by men. Her wage was not sufficient to make her self-supporting and certainly not adequate to warrant any extended training. A very large percentage of increase was essential to placing women teachers on anything like a professional plane. The same reasoning applies to the increases of both sexes in the rural schools. In these cases, the percentage of increase is fully as much a reflection of the very meagre wage received at the beginning of the period as of the more favorable status at its close.

The small relative increase in the case of men teachers in cities is deserving, however, of careful consideration. For a period of 40 years after 1875 the salaries of men teachers appear to have remained on almost a dead level. For these years up to 1915 the level was actually lower than in 1874 and 1875. In a period of rising wages the salaries of these men teachers remained on the old levels. What the small percentage of increase means in terms of securing and retaining in education men who will be leaders will be

more evident in later comparisons of teachers' salaries with the cost of living and with the salaries of other workers. It is significant in this connection that the percentage of men teachers in the schools of the country has fallen from 43 per cent in 1880 to 16 per cent in 1918.

Trends in the Past Five Years

The movements of salaries in the past five years are so distinctive as to warrant a separate accounting. Table 3 presents the figures of the four salary indexes from 1916 to 1920 as percentages of the figures for the year 1915. Thus in 1916 the salaries of women teachers in cities were 104 per cent as great as in 1915, and in 1920 they were 169 per cent as great.

TABLE 3.—TEACHERS' SALARIES FROM 1915 TO 1920, IN PER CENTS OF FIGURES FOR 1915

Year	Rural		City		All teachers
	Men	Women	Men	Women	
1915	100	100	100	100	100
1916	98	102	102	104	102
1917	103	103	98	106	103.8
1918	111	105	108	114	108.8
1919	127	116	131	135	123.9
1920	144	130	163	169	144.9

City women teachers show the largest percentage gain; city men come next, rural men next, and rural women last, with an increase of only 30 per cent over the 1915 salaries. In general city teachers have secured increases to meet new conditions more rapidly than have rural teachers, and men teachers in the country more rapidly than women rural teachers.

The final column of Table 3 gives the relative figures for teachers in general during these years. The figures are an average of the data of the four other columns weighted according to the proportions of the whole teaching force in each of the four groups. The computations are based on each 100 teachers consisting of 30 city women teachers, three city men teachers, 51 rural women teachers, and 16 rural men teachers.

Taken as a whole teachers' salaries have increased less than 50 per cent since 1915. Four-fifths of this increase has been in the past two years and nearly half of it within the current year. The importance of these increases can only be understood as we compare them with the increase in the cost of living and with the general movement of wages.

Summary

1. The trend of salaries is best obtained by the method of the index number.

2. The index number is computed by securing average salary figures from a selected and unchanging list of communities over a long period of years, and averaging the figures from these same communities for each year.

3. The first attempt to secure an index number for teachers' salaries was made by Dr. Roland P. Falkner for the 52 years from 1840 to 1891.

4. In the present study four index numbers have been computed for a period of 80 years, 1841 to 1920,

for the salaries of men and of women teachers in rural and in city schools.

5. Salaries of the four types of teachers show in general very similar trends.

6. In similar communities men have been paid considerably more than women teachers.

7. City teachers have been paid more than country teachers regardless of sex.

8. The salaries of women teachers have been gaining on those of men teachers and those of country teachers on those of city teachers.

9. Women country teachers have had the largest percentage increase in salary, and city men teachers the smallest.

10. In the past five years teachers' salaries have increased 45 per cent. City teachers show the largest gains.

CHAPTER III

TEACHERS' SALARIES AND THE COST OF LIVING

The two dollars and fifty cents which the young woman teaching in a rural school received for a week's work in 1841 was a very different sum of money from that same amount in recent years. Its value was different and this difference was determined by two considerations. In the first place, its purchasing power was different. It would buy more milk, and beef, and potatoes and other farm products, but it would actually buy less of many of those articles in the manufacture of which machine work has now replaced laborious hand processes.

Price Changes 1841 to 1919

This difference in purchasing power of the weekly wage then and now is illustrated in Table 4 which gives prices of several typical important items of family expenditure in 1841, 1900, and 1919. Articles have been selected for which there is a standard unit which has not changed much during the 80 years. The figures represent as nearly as possible the cost of the same purchase in three different years. They come from a number of sources: reports of the United States Bureau of Labor Statistics and the

Massachusetts Bureau of Statistics of Labor; the Aldrich Report of the Senate; records of Army and Navy purchases, and other miscellaneous records and reports. Each figure is based on a considerable number of quotations.

TABLE 4.—COSTS IN CENTS OF CERTAIN NECESSITIES

Article	Amount	1841	1900	1919
Flour	1 lb.	4	2.5	7
Fresh beef	1 lb.	9	13	39
Milk	1 qt.	5	7	15.5
Sugar	1 lb.	8.5	6	11
Potatoes	1 pk.	17	21	57
Calico	1 yd.	18	6	20
Blankets	5 lb.	275	300	975
Shoes	1 pr.	125	200	750
Illuminating oil	1 gal.	115	18	35

Of five kinds of foods listed, three went up between 1841 and 1900, while two went down, flour and sugar. Both of these are products of manufacture. Calico was lower in 1900. Shoes and blankets were a little higher. Oil for illumination shows the greatest difference in price. The 1919 prices are all higher than the 1900 prices. These figures make evident the need for a careful appraisal of the purchasing power of the teacher's salary. We need a cost of living index number to compare with salary index numbers.

Changes in Standards of Living

But there is another consideration affecting the changing value of the teacher's pay besides its absolute purchasing power, and that is its power to put the teacher on an equal social footing with other

people. Salary standards and the standard of living which they determine, as well as the cost of living, must be considered. It was no great hardship to own only one silk dress in a lifetime when other people did the same. If wearing patched clothing was the custom, a wage that made patching necessary was no cause for complaint. When oranges appeared only on tables of the wealthy one could make no case for an increase in the teacher's salary on the ground that she could not afford to purchase them. But if people generally wear silk dresses, despise patching, and eat oranges, the teacher should be able to do so as well. The standard of living of the community is fully as important as the actual cost of living in determining the adequacy of any wage. The standard of living is determined by the salaries other people receive. Although there were important changes in the cost of necessities in the past 80 years, there were even more important fluctuations in the general levels of wages.

Table 5 gives illustrative cases of the changes in salary levels in the past 80 years. Salaries of the workers here represented practically doubled between 1841 and 1900, and doubled again between 1900 and 1919. Increases such as these changed the standard of living over the period of 80 years. With higher wages better houses, better food, better clothing, more education and recreation are possible; new levels become fixed. A salary to be adequate must keep pace with the advancing standards of living as well as with the cost of the means of subsistence.

TABLE 5.—WEEKLY WAGES OF LABORERS, ARTISANS, AND TEACHERS[1]

Worker	1841	1900	1919
Laborers	$4.86	$8.94	$23.02
Carpenters	8.16	16.10	33.57
Machinists	8.52	15.38	34.64
Printers	8.58	16.25	28.45
Women city teachers	4.44	13.88	28.57

[1] The figures are taken from series of index numbers which will be presented in a later chapter.

It will be the purpose of this chapter to compare teachers' salaries for 80 years with the changing cost of the necessities of life. The succeeding chapter will deal with the larger problem, the changing standards of living as they are determined by the wages of other workers. To this end index numbers of the trends of wages of laborers and artisans will be compared with the four index numbers of teachers' salaries.

As a companion study to this one the Department of Statistics of the Russell Sage Foundation, under the direction of Dr. Leonard P. Ayres and Dr. Ralph G. Hurlin, has been carrying forward an investigation of the fluctuations in the cost of living and the wages of laborers and artisans for 100 years, from 1820 to 1920. Index numbers have been computed for living costs and wages for this period. Since the detailed findings will be published in a separate volume, the final index figures are used in this report with only a brief account of their derivation and meaning.

A Cost of Living Index Number

A careful search of the literature on the subject failed to discover any adequate index of the cost of living for a long period of time. The Department of Labor and the Industrial Conference Board have published figures, but only covering the past few years. For a longer term the index number commonly used has been that of wholesale commodity prices. The work of a number of investigators has carried this figure back to the beginning of the nineteenth century. Wholesale prices do not, however, serve the present purpose well. Their fluctuations are more rapid and larger than those of the retail prices which the consumer pays. This may be demonstrated by figures for the Civil War period and the recent rise in prices. The first two columns of Table 6 show the rise of wholesale commodity prices compared with retail prices of food during the Civil War, and the last two columns show similar data for the past six years. The figures

TABLE 6.—INDEX NUMBERS FOR WHOLESALE COMMODITY PRICES AND RETAIL FOOD PRICES—TWO WARS[1]

Year	Wholesale Commodity	Retail Food	Year	Wholesale Commodity	Retail Food
1861	100	100	1914	100	100
1862	118	108	1915	101	99
1863	163	131	1916	124	111
1864	230	171	1917	176	144
1865	212	177	1918	196	167
1866	188	176	1919	212	184

[1] The numbers for wholesale commodity prices are based on the index numbers of wholesale prices in *Bulletin 181*, 1915, p. 266, and *Monthly Labor Review*, February 1920, p. 89, United States Bureau of Labor Statistics. For retail food prices the numbers are based on an index to be presented later in this chapter.

are shown as per cents of the first year. Wholesale prices in both periods rose faster and further than retail prices and could not be taken as representing retail fluctuations. In the Civil War period wholesale prices rose to 230 per cent of the early level; retail prices only to 177 per cent. By 1919, in the recent war period, wholesale prices reached a level 212 per cent of the 1914 figure with retail prices at only 184 per cent.

The differences between these wholesale commodity and retail food price quotations are probably accounted for in two ways. In the first place, there is a distinct lag between the movement of wholesale and retail prices for the same article, and not only a lag but often a real difference in levels reached. In the second place, wholesale price index numbers which have been computed include a large number of articles, most of which affect the cost of living slowly and indirectly. These disadvantages made it essential to look further for a cost of living index.

Food as a Basis

The German economist Engel formulated in 1857 an economic doctrine which has become known as Engel's law.[1] One of the principles of this law was that the proportion of family expenditures devoted to subsistence was in inverse relation to the size of the income. Engel found that in families where the earn-

[1] Portions of Engel's original essay were reprinted in the *Sixth Annual Report* of the Massachusetts Bureau of Statistics of Labor, Boston, 1875, p. 437.

ings were barely sufficient to supply immediate needs the cost of food tended to be more than one-half of all expenditures. The studies of family expenditures which have been made in this country by the Massachusetts Bureau of Statistics of Labor, and later by the United States Bureau of Labor Statistics, tend to substantiate Engel's findings. Among the better paid wage earners, particularly in recent years, food expenditure has fallen to 40 or even 35 per cent of the total budget, but among the less well paid the proportion has often run higher than 50 per cent. If an average be taken for a number of extensive studies which have been made in the past 75 years, the typical family spent 46 per cent of its income for food. Rent was second with 16 per cent, and clothing third with 14 per cent. Other items were scattered.

On the basis of these and similar facts it was decided that the best single index of the changes in the cost of living would be an index number of the changes in the retail price of food. Moreover the figures were available for constructing such an index number. It was possible to select 10 staple articles of food which constituted the bulk of all food purchases in the average wage earner's family, and to trace their prices back to the year 1820. From a number of different sources sufficient quotations were secured for each year to give a representative figure. The articles used were the following:

Three meats: beef, pork, poultry

Three dairy products: butter, eggs, milk

Three manufactured foods: flour, sugar, lard
One vegetable: potatoes

When the quotations had been secured for each year for the 10 articles they were combined in a general average, weighting each one in accordance with its importance in the typical family budget. The resulting averages gave the trend of the prices of these articles over the period of 100 years. In order to make the figures easily comparable with wages the average was multiplied by a factor which would bring the figure for the year 1901 to the total weekly budget of a typical wage earner's family consisting of a man and wife and two small children. Thus the index number of the cost of food was turned into an index number of the cost of living.

The principal assumption necessary in making this change was that the other less important items of the family budget have fluctuated in something the same way as the price of food. Considerable evidence to support this assumption has been found in the trends which it has been possible to construct for the retail price of clothing, the price of rent, and of fuel. These trends show a remarkable resemblance to the food curve.

The final figures for the index number are given in Table 7. They represent the weekly cost for a small family of food, clothing, shelter, and incidentals, assuming that they lived on about the same scale as a typical working-man's family in 1901. They measure the cost of the same purchases over the period of 80 years.

TABLE 7.—COST OF LIVING PER WEEK FROM 1841 TO 1920 FOR A SMALL FAMILY USING THE SAME AMOUNTS OF THE SAME COMMODITIES OVER THE ENTIRE PERIOD

Year	Cost per week	Year	Cost per week
1841	$7.00	1881	$9.04
1842	6.70	1882	9.33
1843	6.71	1883	8.78
1844	6.68	1884	8.31
1845	7.05	1885	8.09
1846	7.39	1886	8.17
1847	7.94	1887	8.19
1848	7.90	1888	8.45
1849	7.65	1889	8.47
1850	7.31	1890	8.47
1851	6.63	1891	8.62
1852	6.72	1892	8.45
1853	6.75	1893	8.66
1854	7.62	1894	8.18
1855	8.02	1895	8.04
1856	8.00	1896	7.87
1857	8.43	1897	8.01
1858	7.66	1898	8.25
1859	7.97	1899	8.28
1860	7.89	1900	8.45
1861	7.66	1901	8.84
1862	8.26	1902	9.36
1863	10.02	1903	9.37
1864	13.10	1904	9.53
1865	13.54	1905	9.52
1866	13.45	1906	9.80
1867	12.96	1907	10.27
1868	13.05	1908	10.57
1869	12.25	1909	11.09
1870	11.58	1910	11.62
1871	10.88	1911	11.46
1872	10.81	1912	12.22
1873	10.61	1913	12.52
1874	10.40	1914	12.83
1875	10.16	1915	12.66
1876	9.77	1916	14.20
1877	9.66	1917	18.50
1878	8.72	1918	21.42
1879	8.61	1919	23.63
1880	8.73	1920	25.50

The Trend of the Index Number

The figures of Table 7 are shown graphically in Diagram 10. The trend line is drawn through the

diagram to fit the general movement of the curve as in previous diagrams, except for the fact that in this case the trend line is computed for 75 years only. The reason for this change is that a trend line drawn for the entire 80 years would be so affected by the movement of the past few years that it would not accurately represent the more general tendency. The

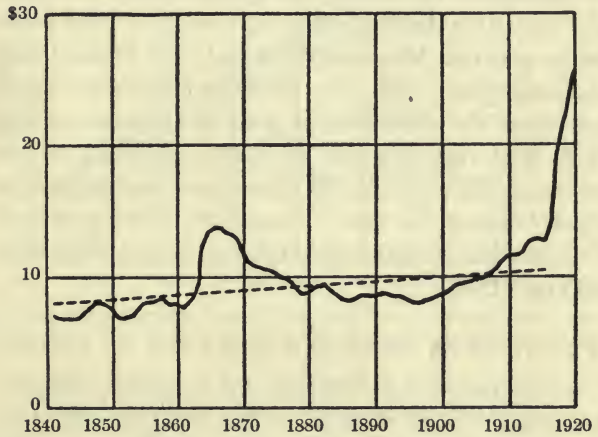

Diagram 10.—Cost of living per week from 1841 to 1920 for a small family using the same amounts of the same commodities over the entire period

rise since 1915 has been so distinctive that it needs separate treatment. In fact we shall deal with the diagram as two trends, one from 1841 through 1915, and the other for the past five years.

For the 75 year stretch the curve shows little upward tendency. The weekly figure for 1900 is less than

two dollars higher than that for 1841. After the sharp rise at the time of the Civil War the curve falls off again slowly until it nearly reaches its pre-war level. The line which is computed for the general trend shows a rise for the entire period of a little less than three and one-half cents a year.

The curve itself in its various fluctuations reflects the economic history of the period which it covers. The rise in the latter forties followed new tariff legislation and the Mexican War, and that in the fifties was coincident with the business expansion which succeeded the discovery of gold in California. The Civil War rise falls off gradually, reaching a low point in 1878 with the culmination of the depression which followed the war. The effects of other periods of depression are evident in the low points reached in 1885 and 1896.

Teachers' Salaries and the Cost of Living

It is now possible to compare, on the same diagram, the trend in the cost of living and the trend of teachers' salaries. This is done for the 75 year period from 1841 to 1915 in Diagram 11, which compares the trend lines for teachers' salaries and the cost of living in terms of per cents, taking the initial figure in 1841 as 100 per cent in each case. The trend of the cost of living shows an increase of only 31 per cent. The purchasing power of the dollar was nearly the same at the latter part of the period as near the beginning. On the other hand, teachers' salaries have gone up sharply. As far as the absolute purchasing power of

his wage was concerned the position of the teacher was steadily improving.

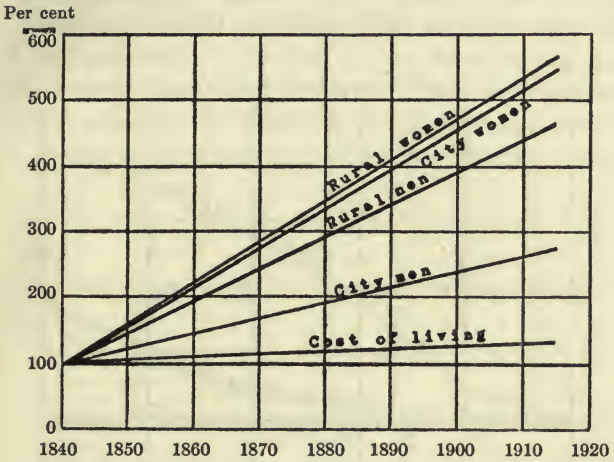

Diagram 11.—Trends of teachers' salaries compared with the trend of the cost of living, in per cents of the figures for 1841

The Situation Reversed, 1915 to 1920

During the past five years the cost of living has increased 100 per cent while teachers' salaries have risen 45 per cent. Not only has the cost of living risen further but it has risen faster. It made a gain of nearly 50 per cent before teachers' salaries began to rise. The character of the two curves is shown in Diagram 12. The figures for the cost of living are those of the index number for the past five years computed as per cents of the level for 1915.

Those for teachers' salaries are the average per

cents for the four teachers' indexes. The figures will be found in Table 3 on page 44. The cost of living made a very considerable increase in 1916 and the sharpest of all in 1917 when the United States en-

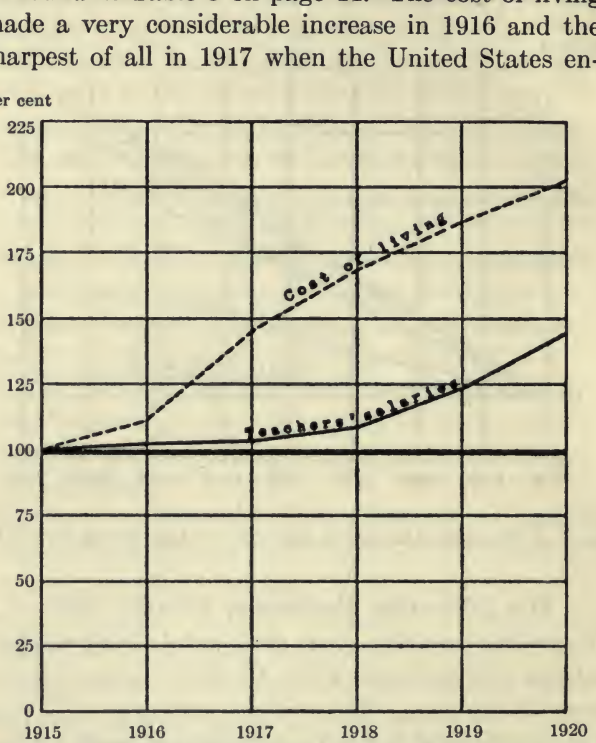

Diagram 12.—Teachers' salaries and the cost of living each year from 1915 to 1920 in per cents of the figures for 1915

tered the War. The advance has continued although there now seem to be some indications that the peak has been reached. The increases in teachers' salaries were hardly appreciable until 1919 while the sharpest

rise has occurred in the current year. A perceptible gain is now being made on the cost of living.

Wage and Cost Trends for Women Teachers

The relationship of salaries to the cost of living over the entire period of 80 years will be clearer if we follow through the situation of one class of teachers

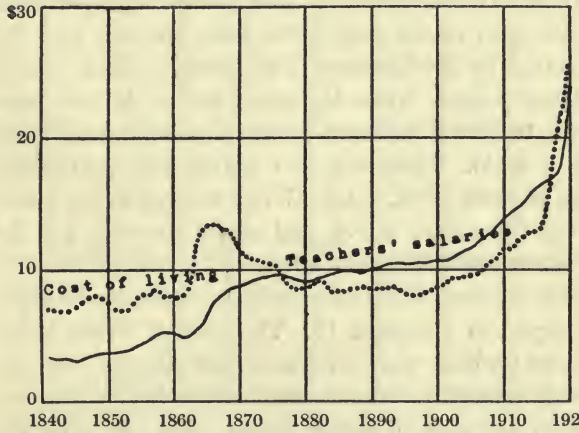

Diagram 13.—Average weekly salaries of women teachers in rural and city schools compared with the cost of living. 1841 to 1920

for those years. For this purpose an average salary of all women teachers has been computed by combining country and city index numbers.[1] This average is

[1] In computing the average the country teacher figure was given a weight of two and the city average a weight of one. This makes the average a little high in the early years when the population was predominantly rural and a little low today when the relation of rural to city teachers is about three to two. This weighting probably gives a fair average.

plotted in Diagram 13 and, on the same background, is placed the curve for the cost of living. The salaries of teachers start far below the cost of living curve. This means that the woman teacher, if she had any dependents, could not afford to purchase the kind of food, clothing, and shelter which the curve represents. Her wage did not pass the cost of living curve until after the Civil War. The change was the result of the drop in the cost curve after the war and the retention by the teachers of all the gain made during the war period. From the point where the two lines cross, teachers' salaries make a steady gain until nearly 1900. Then the two curves run practically parallel until 1916. In 1917 the cost of living curve passes the salary curve and stays above it for the following years.[1]

The relation of the two series of figures is brought out again in Diagram 14. The cost of living index number for each year is taken as 100 per cent, and the average salary of women teachers is plotted as a per cent of the cost of living figure. The per cent the teacher's salary figure is of the cost of living figure indicates what part of a certain specified amount of food, clothing, and shelter a teacher's salary will buy. The diagram gives us a measure of the purchasing power of the teacher's wage.

[1] It should be remembered in the interpretation of this and the following diagram that the cost of living curve is simply valuable as showing the relative levels of the cost of the same kind of living from year to year. The kind of living it represents is that of workingmen's families in 1901. It does not represent the cost of living for a school teacher today.

In 1841 the teacher's weekly salary would buy not quite half of a unit of food, clothing, and shelter of the type we have taken for a standard cost of living. When the teacher purchased her living she had to buy an inferior quality to that which the working-

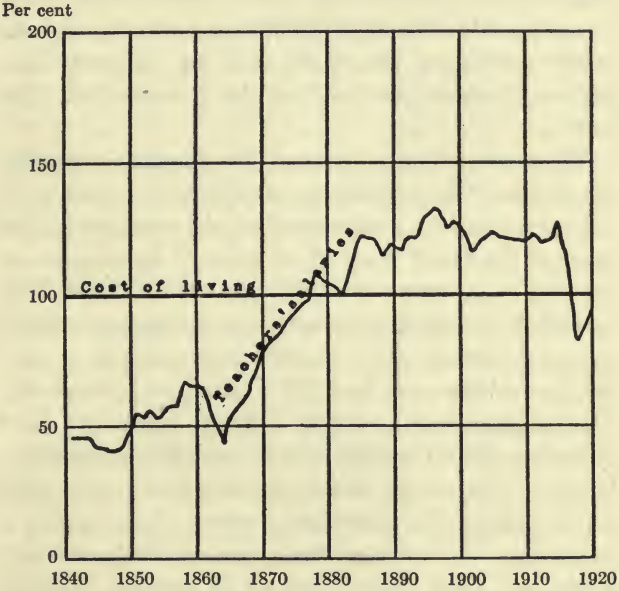

Diagram 14.—Per cent the average salary of women teachers was of the cost of living each year from 1841 to 1920

man bought in 1901. In 1877 her salary was just sufficient to purchase a living of similar quality to the workingman's. Then her wage rose until it reached its greatest purchasing power in 1896. There followed a considerable plateau until 1915 when the cost of

living rose so fast and salaries so slowly that their purchasing power went lower than at any time since the year 1872, just after the Civil War. In 1918 and 1919 the teacher could buy less of the necessities of life than at any time in 40 years. The situation is improved in 1920 but the same statement may still be made truly. The considerable advances in teachers' salaries within a year have thus far brought them back only about one-third of the distance that they fell.

There are other features of the diagram deserving attention. The experience of this war period is in enlarged measure a repetition of what occurred at the time of the Civil War. A number of movements in the other direction in 1858–59, 1877–78, 1883–86, and 1893–96 reflect some type of financial depression. A generalization can be made that teachers prosper in times of adversity and suffer in times of prosperity. The explanation is simple. When times are hard prices go down through lack of competition between buyers. Wages go down but salaries retain their levels. Hence the purchasing power of the salary is increased. Prosperous times are periods of high prices and high wages, just as at present. Salaries remain stable, however, and their purchasing power is less.

Thus we have in the present relation of teachers' salaries and the cost of living no new economic principle at work. The seriousness of the situation consists in the size of the fluctuations which have taken place. Through 40 years the teacher has steadily

been gaining in recognition as a professional worker. She has been receiving constantly more and better training. This has been made possible by a constantly advancing salary. Now in two years all of the ground gained has been lost and the teacher finds herself in a worse situation financially than at any time since the Civil War period.

There seems good reason, in the experience of the past, to believe that adequate adjustment to the new price levels will be made. It should be realized, however, that only a good beginning has been made in effecting that adjustment. The major part of the task is still to be carried through.

Summary

1. The adequacy of salaries must be judged by comparing them with the cost of living and the standard of living.

2. The cost of living is measured by the price of the necessities of life and the standard of living by the wages received by other workers.

3. An index number is available based on food prices showing changes in the cost of living for 100 years.

4. For the 75 years, 1841 to 1915, the trend of the cost of living increased only 30 per cent while the trend of the salaries of different kinds of teachers increased from five to 15 times that much.

5. From 1915 to 1920 the situation was reversed and the cost of living increased twice as much as teachers' salaries.

6. As a result of recent price increases the purchasing power of the teacher's salary is less than at any other time since the Civil War period.

7. Through large increases in 1919 and 1920 teachers' salaries have begun to overtake the cost of living but only a beginning has been made.

CHAPTER IV

SALARIES OF TEACHERS AND OF OTHER WORKERS

A convincing statistical study of the relations between wages of different kinds of workers and between wages and the cost of living was presented by Professor H. L. Moore of Columbia University in 1911 in a book entitled *Laws of Wages*.[1] By a thorough application of modern scientific statistical methods Professor Moore was able to secure proof for a number of economic laws which had been up to that time almost wholly matters of theory.

Wages and the Cost of Living

Among other findings Professor Moore drew the conclusion that there was no direct causal relationship between the wages of laborers and the cost of living,[2]

[1] Macmillan Company, New York.

[2] The expression which Professor Moore used instead of cost of living was means of subsistence. The figures used were, however, quite similar in their derivation to the figures used in Chapter III of this book as the index numbers of the cost of living. The latter term has therefore been used for the convenience of the reader. The figures from the French departments are designated coefficients de depense en objets d'alimentation et de chauffage. They are average figures for the price of food and fuel weighted in accordance with the relative amounts of the different articles consumed by a number of typical families.

but that there was a close relationship between the wages received by skilled workers and those received by unskilled laborers. The data upon which the proof of these conclusions was based were the records of the wages of skilled and unskilled labor and the cost of the means of subsistence in the 87 departments of France for the year 1896. There was a general tendency in these departments for the wages to be high where the prices of food and fuel were high and for wages to be low where prices were low, but this tendency was only a general one. The relationship between prices and wages was not close enough to be considered one of cause and effect. On the other hand, a much closer relationship existed between the wages received by skilled labor and those received by unskilled labor. The wages of skilled labor were evidently determined in considerable degree by the wages of unskilled workers.[1]

The data which were presented in Chapter III of this book supply evidence for this country looking in the same general direction as Professor Moore's conclusions. The salaries of teachers have in a very general way fluctuated with the cost of living, but there have been many exceptions and there does not appear to be any direct causal relationship between the two series of figures.

[1] The coefficient of correlation between the money wages of unskilled labor and the cost of the means of subsistence was .306 and that between the wages of unskilled labor and the wages of skilled labor was .775. These coefficients were computed by the Pearson formula.

Wage Index Numbers for 80 Years

Evidence which has been secured as to the relationship between the wages of different kinds of workers is still more convincing in the support which it gives to Professor Moore's findings. Index numbers have been computed for the weekly wages of unskilled laborers and of skilled workmen for a period of 80 years from 1841 to 1920. These numbers are plotted together in Diagram 15.

The lower line represents the average weekly wages received each year by unskilled laborers and the upper line the average weekly wages of artisans. The straight lines running through the curves are the trend or regression lines for 75 years from 1841 to 1915. The two curves follow courses similar to the teachers' salary index numbers which were shown in an earlier chapter. From 1841 until the Civil War they rise gradually. Towards the latter part of the war they turn sharply upward. During the seventies they lose a part of the advantage gained reaching a low point in 1878 and 1879. During the next two decades no advance is made. In 1900, a gradual upward movement begins, followed by a rapid climb in 1915. The rise here is so rapid that it is necessary to consider the trend from 1915 to 1920 separately from the previous trend. It is for that reason that the trend lines are only carried to 1915.

The two curves parallel each other in a remarkable way. Almost every rise and fall in one is accompanied by a similar movement in the other. There is every evidence of a causal relationship between the

two. The evidence differs from that presented by Professor Moore in that the series of figures represent different years rather than different localities, but their significance is as great in demonstrating the close relationship of different types of wages. The parallelism between the two trend lines may be compared with the differing trends of salaries and the cost of living shown in Chapter III.[1]

Three periods may be distinguished in the relationship of the two wage curves. From 1841 to 1900 the curves run almost exactly parallel. The artisans' curve is constantly about 70 per cent higher than the curve for the wages of unskilled labor. It can be said that during those years the special training of the artisan was worth just 70 per cent of a laborer's wage. It enabled the artisan to earn 170 per cent as much money as the unskilled laborer. From 1900 to 1915 the wages of artisans rose somewhat more rapidly than those of common labor, an

[1] While the trend lines measure the general tendencies, they do not measure the tendencies toward concomitant variation between the lines of original data. For the latter purpose coefficients of correlation have been computed between the wages of unskilled labor and the wages of artisans and the cost of living. In these computations the deviations of the measures for each year were taken not from a simple average but from a ten year moving average. The deviation of each measure was found from an average of ten measures including the measure itself, the four preceding measures, and the five following ones. From these deviations the coefficients of correlation were computed by the Pearson formula. Only the figures from 1841 to 1912 were used as the later figures were so large as to overshadow earlier differences if they had been used. The resulting coefficient between wages of laborers and artisans was .89 and that between the wages of laborers and the cost of living .56.

advance probably due to the success of the trade union movement among skilled workingmen. From 1915 to 1920 unskilled labor was at a premium with immigration cut down and the need for workers increased, and laborers' wages rose somewhat more

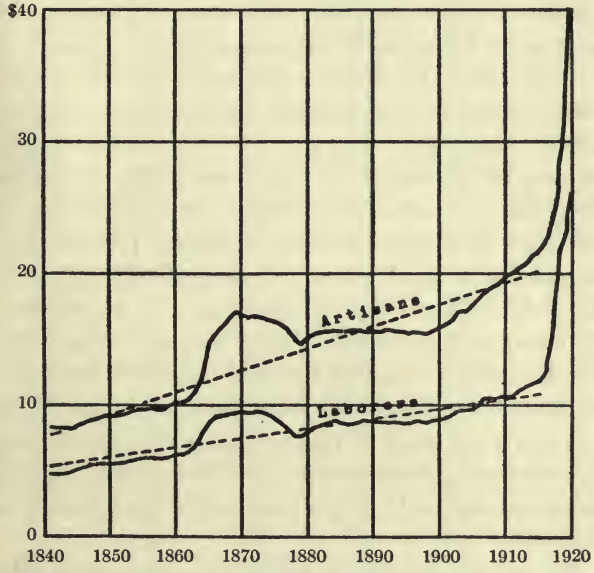

Diagram 15.—Weekly wages of laborers and artisans. 1841 to 1920

rapidly than those of artisans. These differences, however, between the movements of the two series of wages are minor in light of the larger resemblances.

The figures upon which Diagram 15 is based are

given in Table 8. The quotations representing the wages of unskilled labor are averages computed from records of the pay rolls of individual manufacturing establishments, municipalities, building contractors, and other miscellaneous concerns. Common labor is usually easily distinguishable as a distinct type of worker in the records of these firms. The payrolls used have been found in a considerable number of compilations. The more important were the various publications of the United States Department of Labor, the early reports of the Massachusetts Bureau of Statistics of Labor compiled under the direction of Carroll D. Wright, the *Report on the Statistics of Wages* by Jos. D. Weeks published as volume 20 of the Census of 1880, and the report of the Aldrich Committee of the Senate. For long series of years unchanging lists of establishments were used. For example one list of 69 establishments was used for 30 years unbroken. The manner of computation was much the same as that employed in constructing the teacher indexes except for the fact that in this case a considerably larger number of quotations was available.

The index numbers for artisans' wages are averages of the wages of five types of skilled workers: blacksmiths, carpenters, machinists, painters, and printers (compositors). In all of these trades there have been no such fundamental changes as to affect the comparability of the data. The sources of information were largely the same as for laborers.

TABLE 8.—WEEKLY WAGES OF LABORERS AND ARTISANS. 1841 TO 1920

Year	Laborers	Artisans	Year	Laborers	Artisans
1841	$4.86	$8.28	1881	$8.16	$15.28
1842	4.86	8.33	1882	8.52	15.44
1843	4.92	8.28	1883	8.70	15.56
1844	4.92	8.33	1884	8.86	15.77
1845	4.98	8.38	1885	8.64	15.61
1846	4.98	8.60	1886	8.52	15.60
1847	5.22	8.88	1887	8.70	15.62
1848	5.34	8.86	1888	8.86	15.65
1849	5.28	9.07	1889	8.82	15.58
1850	5.46	9.10	1890	8.82	15.64
1851	5.52	9.14	1891	8.94	15.63
1852	5.52	9.12	1892	8.88	15.84
1853	5.64	9.41	1893	8.88	15.72
1854	5.76	9.71	1894	8.86	15.45
1855	5.76	9.85	1895	8.70	15.37
1856	5.88	9.84	1896	8.86	15.49
1857	5.88	10.04	1897	8.86	15.41
1858	5.82	9.88	1898	8.82	15.44
1859	6.00	10.02	1899	8.88	15.55
1860	6.18	10.07	1900	8.94	15.82
1861	6.24	10.24	1901	9.24	16.05
1862	6.36	10.30	1902	9.36	16.52
1863	7.08	11.02	1903	9.60	17.04
1864	7.98	12.66	1904	9.66	17.13
1865	8.94	14.90	1905	9.78	17.58
1866	9.30	15.36	1906	10.08	18.13
1867	9.24	15.97	1907	10.47	18.74
1868	9.30	16.66	1908	10.42	19.04
1869	9.42	17.08	1909	10.49	19.17
1870	9.36	16.94	1910	10.62	19.79
1871	9.42	16.82	1911	10.69	19.99
1872	9.36	16.91	1912	10.95	20.38
1873	9.48	16.83	1913	11.31	20.78
1874	9.12	16.45	1914	11.41	21.25
1875	8.82	16.20	1915	11.84	21.38
1876	8.46	15.96	1916	13.00	22.44
1877	8.04	15.52	1917	16.28	23.80
1878	7.74	14.89	1918	22.01	28.31
1879	7.80	14.74	1919	23.02	33.05
1880	7.86	14.98	1920	26.00[1]	42.00[1]

[1] Estimated.

Wages of Other Workers

In order to make a comprehensive comparison between the salaries of teachers and the wages of other

workers it would be desirable to secure figures for other types beside unskilled and skilled labor. A careful search has been made for data that would make possible the construction of index numbers for other kinds of workers. As a result a number of fragmentary series were found. The Weeks' report in the Census of 1880 gives the wages of foremen and shop superintendents in manufacturing establishments from 1840 to 1880; the reports of the Postmaster General give figures from which it is possible to compute rough figures for the wages of city letter carriers from 1864 to 1918; the reports of the Department of Agriculture give the wages of farm laborers at intervals from 1866 to 1918.

In the course of this study the wages of these various types of workers have been plotted with laborers and artisans. In every case the curve ran roughly parallel to the wage curves in Diagram 15. Whatever evidence it has been possible to secure all goes to substantiate the generalization that there is an exceedingly close relationship between the wages of various types of workers. In comparing teachers' salaries with the wages of laborers and artisans we are comparing teachers' salaries with the basal wages which we may safely take as representative of the general movement of wages.

Country Teachers and Unskilled Laborers

Diagram 16 brings together the curves for the salaries of teachers in rural schools and the wages of

laborers.[1] In 1841 the salaries of men teachers were slightly lower than laborers' wages while women's salaries were considerably lower. The three curves from that point on follow similar courses: fluctua-

[1] In this and succeeding diagrams and tables throughout this chapter it has been decided after careful consideration to use figures for weekly pay for weeks actually worked. The reasons leading to this decision were briefly as follows:

1. The figures could be secured in this form and could not well be turned into annual pay. The records as to how many weeks a year a laborer or artisan works do not exist many years back. For teachers also the records in this respect are not complete.

2. The evidence that was available all pointed towards very similar numbers of weeks of work on the part of city teachers and artisans. Evidence on this matter is found in the reports of the New York State Department of Labor. The Department began in 1904 receiving from representative trade unions reports as to the percentage of members of the unions idle at the end of each month. The figures for the thirteen years 1904 to 1916 are published in Special Bulletin Number 85, July 1917. The figures are given for separate industries and for all industries combined. There are large differences between industries and there are wide seasonal and yearly fluctuations. For all industries the range between the average figures for different years is from about 10 to about 30 per cent of unemployment. The average seasonal fluctuation is from a high point of 28 per cent in January to a low point of 13 per cent in September. The grand average for all industries for 13 years was 19.7 per cent or practically 20 per cent of unemployed. On the average this represents unemployment one-fifth of the time, or in terms of weeks, more than 10 weeks a year. This almost exactly corresponds to the summer weeks when the city teacher is not usually paid. In the light of these facts a comparison between teachers and other workers on the basis of pay for weeks worked seemed reasonable. If it were possible to compute pay actually received for yearly periods the figures arrived at would be more exact. They would show a somewhat larger wage for workmen in good years and a smaller wage in periods of depression. It is not believed that the general trend would be appreciably altered.

3. In the case of rural teachers a shorter school year is offset by greater opportunity for supplementary employment.

tion in one is generally accompanied by a similar fluctuation in the others. There are, however, several notable differences. Up to the last decade teachers have steadily gained on laborers. In the past five years, however, laborers' wages have again

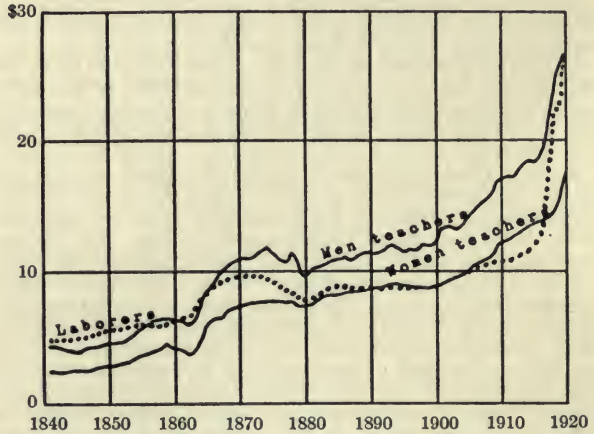

Diagram 16.—Weekly salaries of men and women teachers in rural schools compared with weekly wages of laborers. 1841 to 1920

taken the lead. The salaries of teachers have apparently regained part of their lost ground in the current year. The rapid climb of laborers' wages in this period is in accordance with a general tendency, indicated elsewhere on the diagram, for laborers' wages to move more rapidly than teachers' salaries in any period of fluctuation. Following the Civil War laborers' wages reached their peak about 1868 while

teachers' salaries continued to climb until 1875. In the succeeding depression laborers' wages again lead the way.

The general relationship between the curves up to the year 1915 is shown in Diagram 17 on which the

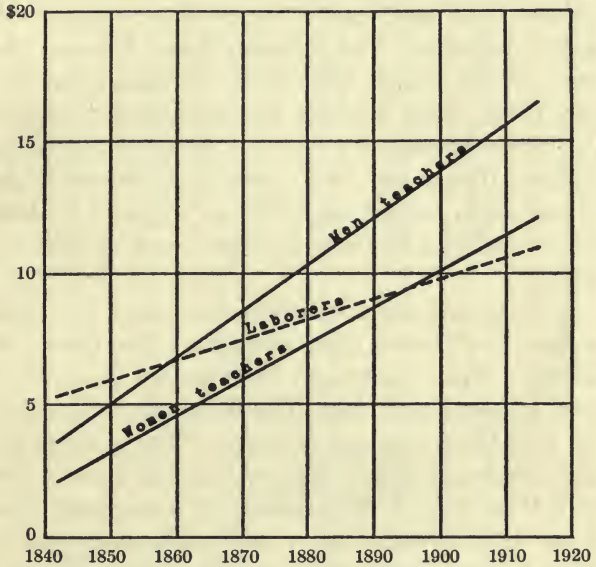

Diagram 17.—Trends of salaries of men and women teachers in rural schools compared with trend of wages of laborers. 1841 to 1915

trend line is plotted for each of the three curves. The diagram illustrates particularly well the manner in which the teachers' curves have overtaken the labor curve.

As there is a close resemblance in trend between the curves showing the wages of unskilled laborers and those for country teachers, so there is a resemblance between the pay of artisans and city teachers. This is illustrated in Diagram 18 in which the figures for artisans and men and women city teachers are plotted together. The correspondence between the wages of city women teachers and artisans is particularly close. Men teachers run considerably higher. The curve for women starts at a figure about half of that for artisans and for 75 years draws nearer to the artisan curve so that, in 1915, the wages of artisans and the salaries of these teachers are very near together.

In the recent rise city teachers have kept pace with artisans much better than country teachers have with laborers. Salary increases for teachers show, however, a considerable lag. The increases occur about one year behind artisan increases. This is again the same tendency which appeared at the time of the Civil War when it took teachers a number of years longer than artisans to secure salary increases to meet changed conditions. Artisans' wages reach a peak in 1869, those of teachers not until 1875.

The figures for male teachers are not so easily comparable with those for artisans. When allowance is made for the largeness of the figures which tend in the diagram to emphasize the fluctuations, the movement is seen to be similar to that of the other two curves, except that the rise from 1900 to 1915 is

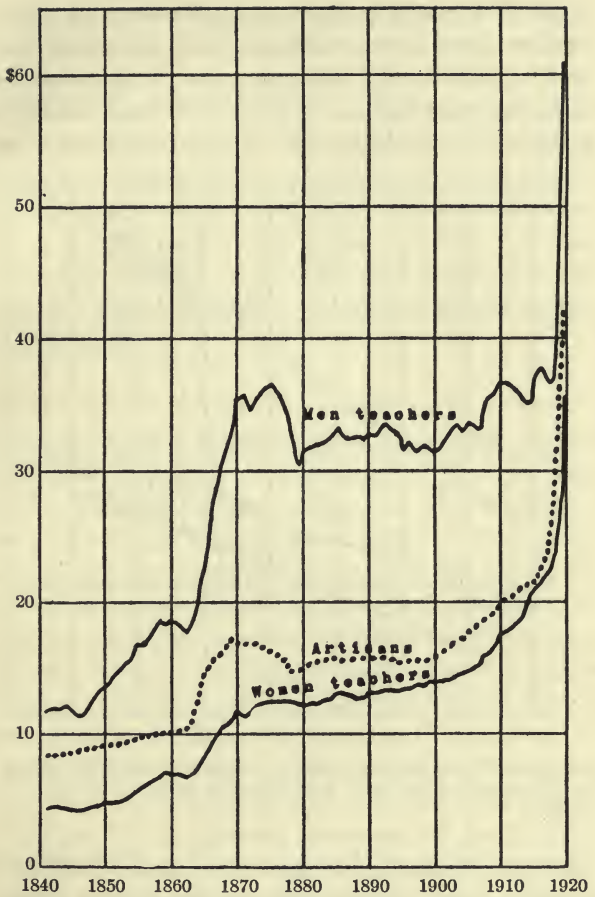

Diagram 18.—Weekly salaries of men and women teachers in city schools compared with weekly wages of artisans. 1841 to 1920

much less marked. Both the artisans and women teachers have exceeded the previous high wage figure of the Civil War by 1905; the curve for men teachers does not go as high as its 1875 level until 1915. It is interesting that the curves for men teachers and arti-

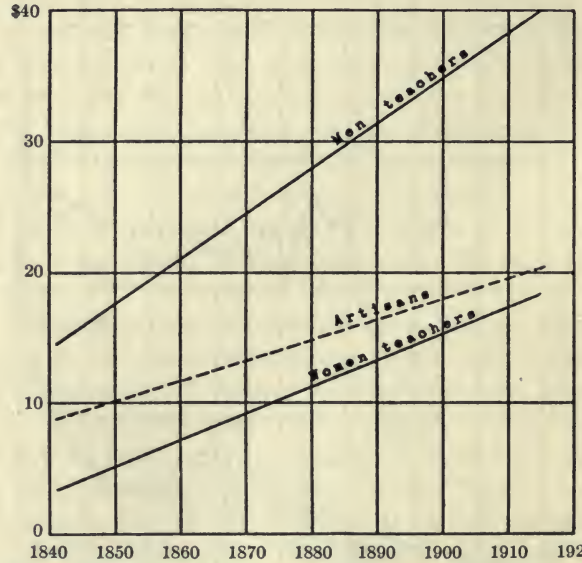

Diagram 19.—Trends of salaries of men and women teachers in city schools compared with trend of artisans' wages. 1841 to 1915

sans both show distinct recessions about 1879 which are hardly reflected in the curve for women. Women teachers were not as much affected as were men by a period of industrial depression.

The general trends of these curves are shown in

Diagram 19, which is chiefly valuable as an illustration of the way in which the women teachers have been gaining on artisans for the 75 year period, 1841 to 1915. The trend line for men teachers is apt to give a false impression. The steepness of the slope of the line caused by the greater size of the figures gives the impression of a more rapid relative increase than actually took place. In this case the percentage increases are probably more significant than the round numbers. They are shown in the next diagram.

Per Cent Increases in Salaries and Wages

Diagram 20 turns the trend lines which were shown in the last diagram and in Diagram 17 into per cent trends taking the regression figure for 1841 as 100 per cent. Rural and city women teachers are approximately together with increases of 450 per cent over the initial figures. Rural men are next with an increase of about 350 per cent. Then after a long gap city men, artisans, and laborers are grouped together at figures between 100 and 200 per cent ahead of the starting point.

It is safe to reason from these figures that for 75 years we have been getting constantly more able and better trained women teachers and better men teachers in rural schools. At the end of the period an able person would be far more likely to choose one of these three types of teaching as his calling than early in the period. A person could much better afford extended training. Hence it is fair to reason

that the much better salaries in these three types of teaching, as compared with wages in other work, meant better teachers. The same statement is not true of city men teachers. Their position in 1915 was

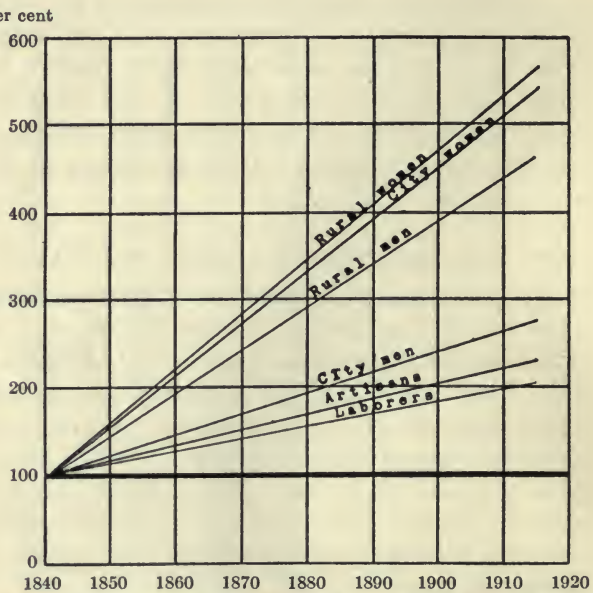

Diagram 20.—Trends of salaries of teachers compared with the trends of wages of laborers and artisans. 1841 to 1915

practically no more desirable than before the Civil War. In the interim the requirements in terms of training and administrative ability have increased greatly. Then the typical man teacher was a grade teacher in elementary school. Today the typical city man teacher is a high school teacher or an ex-

ecutive. Upon this class we rely very largely today for our educational leaders. The requirements of training for the artisan have increased hardly at all in 75 years; the requirements for the man city

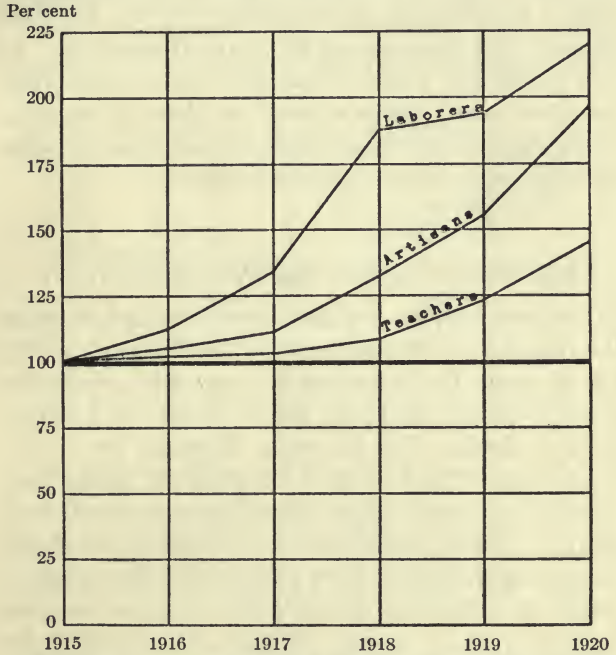

Diagram 21.—Salaries of teachers and wages of laborers and artisans each year from 1915 to 1920 in per cents of the figures for 1915

teacher have been increased many fold. The reward of the teacher has advanced, however, at about the same rate as the reward of the artisan. Relatively the position of the teacher is much less desirable.

The Trend Since 1915

In 1915 a new kind of movement began. Wages started to soar upward. Teachers' salaries have followed a year or two behind. The percentage increases for teachers, as compared with the wages of laborers and artisans, are shown in Diagram 21. In this period the wages of laborers had through 1919 increased nearly twice as much as those of artisans, while wages of artisans have increased twice as much as the average for all types of teachers.

The Wage Value of the Teacher's Salary

In the last chapter a diagram was inserted showing the relative purchasing power of the teacher's salary for 80 years by indicating the per cent which the teacher's salary each year was of the cost of a certain kind of living. The following diagrams are of the same type. The first one, Diagram 22, shows how much of a laborer's wage the average woman teacher's salary would pay each year or, in other words, shows the per cent the teacher's salary is of the laborer's wage. In computing the per cents the figure used for teachers was an average of the index numbers for women teachers in rural and city schools.[1] The curve shows many of the same characteristics as the curve comparing women's salaries and the cost of living.

[1] As in the previous case where an average for salaries of women teachers was used, the figures for rural teachers were given a weight of two and those for city teachers a weight of one.

Teachers' salaries in 1841 were 65 per cent as large as laborers' wages. They show a gain until the high wages of the Civil War dwarf teachers' salaries by comparison. After a large temporary setback they gain again until they reach a peak in 1878, during a period of financial depression when laborers' wages receded. The highest peak was reached in 1914.

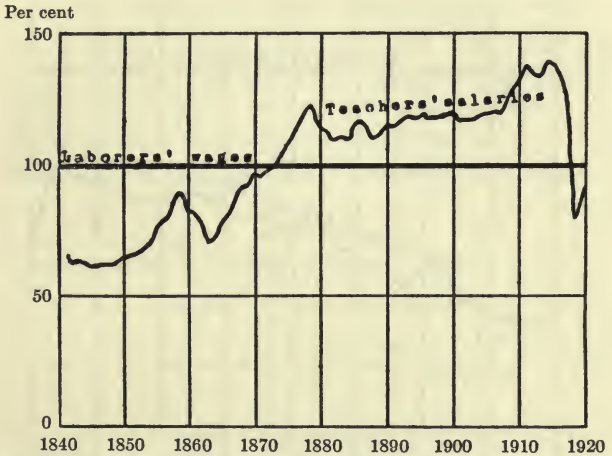

Diagram 22.—Per cent the average salary of women teachers was of the wages of laborers each year from 1841 to 1920

Then, with war increases of laborers' wages, teachers' salaries recede to a point relatively lower than laborers' wages and lower than at any other time since the Civil War. A beginning has now been made in the recovery of lost ground.

In Diagram 23 a similar comparison is made between the average salaries of women teachers and the wages

of artisans. Teachers' salaries have consistently been lower than wages of artisans, but have been steadily gaining so that in 1915 teachers were receiving 75 per cent as much as such workers as blacksmiths, carpenters, machinists, painters, and printers. The figure dropped to 56 per cent in 1919.

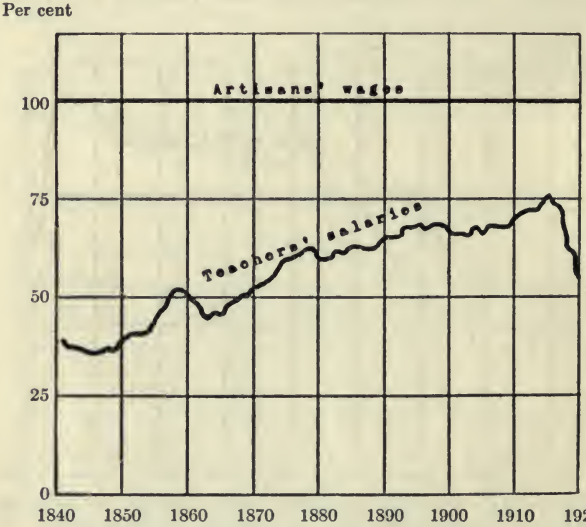

Diagram 23.—Per cent the average salary of women teachers was of the wages of artisans each year from 1841 to 1920

One may summarize the facts set forth in these two diagrams by saying that for 75 years teachers were steadily gaining a professional status as skilled workers. They were steadily achieving differentiation from the unskilled worker. In five years a considerable part of the ground gained has been lost but the

forces have been set in motion for its complete recovery.

The experience of the past would seem to support an optimistic view not alone as to the complete and rapid recovery of all lost ground but as to still further future advances. The trend is upward.

The Artisan's Wage a Working Standard

The evidence from Professor Moore's writings and the similar evidence in this and the preceding chapter all go to show that wages are a better basis for determining salary levels than are figures as to the cost of living. There is slight direct causal relationship between wages and the cost of living. The two do not necessarily fluctuate wholly together. The cost of living depends eventually upon the effort required at any time and in any country to produce the necessities of life. This must fluctuate from time to time and as it fluctuates the cost of living rises or falls quite apart from the movement of wages. The final basis for the amount of pay a man may receive is the amount he is able to produce. All wages are built on what the least competent workman can produce. In the long run what a person receives over and above this wage is compensation for special ability which he possesses. It is these laws which operate to give the wages of laborers and artisans and teachers such similar trends. The progress which the teacher has made in raising her pay in relation to that of other workers has been built on the increased ability which comes from increased training.

In the light of these facts the most valuable comparisons which can be made in determining the levels of teachers' pay are those of which this chapter has given illustration, between the salaries of teachers and other workers. A fuller appreciation of the value of this type of statistics should make available the records of the pay of more kinds of workers, particularly those of higher degrees of training. For the present the standard which seems most immediately within reach for women teachers is that of artisans' wages. The salaries of women teachers have been gradually approaching artisans' wages for many years. The exact level of artisans' wages can readily be obtained in any community for purposes of comparison. The case for teachers receiving at least as high a wage as artisans appears essentially a reasonable one from the point of view of skill and training required. This standard cannot, of course, be taken as a fixed one but simply as the next step in following the trend in the rise in teachers' salaries which accompanies increased training.

Summary

1. There is a closer relationship between the wages paid different types of workers than between wages and the cost of living.

2. Index numbers have been computed for the weekly wages of laborers and artisans from 1841 to 1920.

3. The salaries of country teachers are similar in

amount and in general movement to the wages of unskilled laborers.

4. The salaries of city women teachers are similar in amount and general movement to wages of artisans.

5. From 1841 to 1915 all country teachers and city women teachers gained on laborers and artisans in the amounts of pay received.

6. City men teachers, in spite of increasing requirements, have made practically no greater percentage gains in salary in the 75 years from 1841 to 1915 than have artisans and laborers.

7. Since 1915 the pay of artisans and laborers has increased twice as much as that of teachers.

8. In relation to the laborer the average woman teacher was in 1918, 1919, and 1920 less well off financially than at any other time since the Civil War.

9. The average salary of women teachers was for 75 years gradually approaching the wage of artisans. That wage may well be taken today as a working standard for the pay of women teachers.

CHAPTER V

THE TREND OF BUILDING COSTS

In spite of the remarkable improvement which has taken place in the construction of school buildings in the past 30 years, the percentage of the country's school budget which was spent for new buildings was no higher in 1915 or 1918 than it was in 1890. The proportion remained nearly constant during the period at a figure between 16 and 19 per cent of total school expenditures. The percentages at five year periods and in 1918 are shown in Diagram 24. The two highest figures were reached in 1890 and in 1905. Aside from these two periods all of the figures fall within a range of less than two per cent. There is certainly no tendency toward spending a larger share for new buildings. Back of 1890 complete reliable figures are not available but such evidence as there is seems to point to about as large percentages for school house construction in the early years as are shown in Diagram 24.

The striking uniformity of these percentages is accounted for by the fact that there have been two compensating factors in building which have offset each other to such a degree that building costs have increased at the same pace as other school costs.

There has been, as is generally recognized, a complete transformation in the construction of school buildings in the past 30 years. The modern fireproof structure is entirely different from and far more ex-

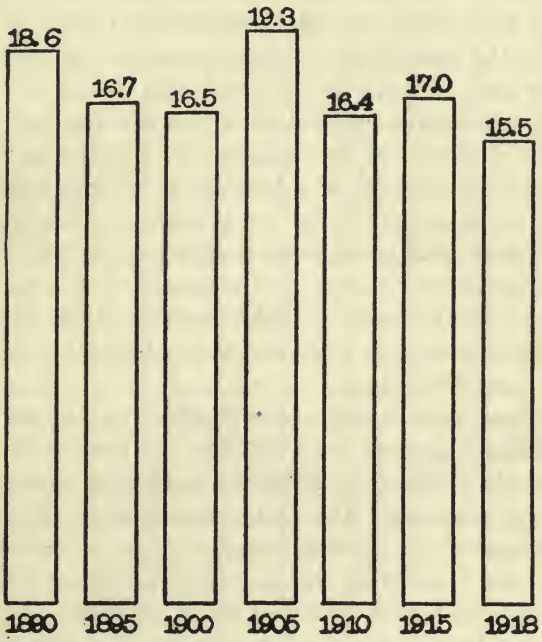

Diagram 24.—Per cent of school expenditures in the United States devoted to sites, buildings, and equipment at five year intervals. 1890 to 1918

pensive than its less substantial predecessors. The cost of this advance in type of construction has been largely offset, however, by the fact that the actual

cost of building material and building labor has risen more slowly than the school budget.

An Index Number for Building Costs

An index number which will show the trend of the cost of building cannot be constructed directly because the same kinds of buildings are not put up year after year. The types are constantly changing. The only practicable method is to compute the building index in terms of its components. On the average about half the cost of a building is labor and about half is materials. There are available from the preceding chapter good index numbers of the trends of the wages of laborers and artisans. These figures taken together with an index number of the cost of building materials will yield approximate trends for the cost of building.

There are available index numbers for the cost of building materials from 1890 to the present in the monthly publications of the United States Bureau of Labor Statistics. This index includes an adequate selection of the different standard types of materials. It is constructed by the method of relatives, the figures for each item each year being expressed as a per cent of the figures of a given year. The average of these percentages is taken as the index number. Back of the year 1890 another series is available in the Aldrich report, made up in the same manner and containing largely the same items. The two series are so similar that they can readily be combined to give a continuous index from the year 1841 to the present.

The resulting curve is shown in Diagram 25 together with the trend line from 1841 to 1915. In this case, as in previous ones, the last five years are so peculiar

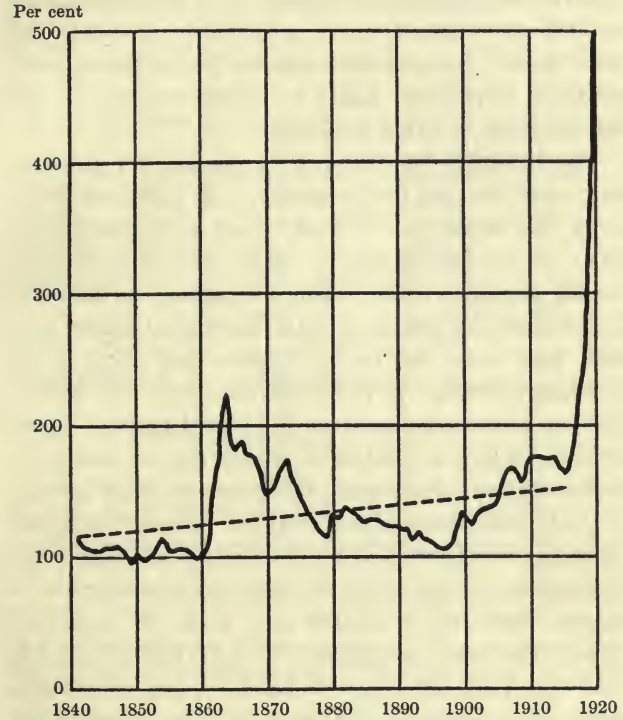

Diagram 25.—Relative prices of lumber and building materials from 1841 to 1920, in per cents of the figures for 1860

in character as to require separate treatment. The figures for 1920 are those for the month of February. It will be noticed that the scale of the diagram is in

percentages, the year 1860 being taken as the base, 100 per cent. The curve with its trend line resembles the curve for the cost of living more than any other thus far included in this study. It is notable that up to 1915 the upward trend in building materials has been slight. Advances in lumber and other natural products have been offset by improvements in the manufacture of other products.

The building figures and the figures for artisans wages are brought into comparison in Diagram 26 by using the trend line of each curve expressed in per cents of its initial figure. Thus over the 75 year period artisans' wages show a tendency to increase 132 per cent, or a step of a little less than two per cent each year over the initial figures, and the cost of building material 36 per cent, or about one-half of one per cent each year over the initial figures. Since artisans' wages and laborers' wages run so nearly together we are safe in using the artisans' index here as typical of the trend of the wages of both artisans and laborers, without the necessity for determining what proportion of the work of building construction is carried forward by skilled and what by unskilled labor. The artisans' figure it will be remembered is made up from the wages of blacksmiths, carpenters, machinists, painters, and printers. The wages of all five of these artisans moved closely together. Hence the index is probably as good for showing the general trend of wages in building as it would be if we took the carpenters and painters alone and it has the added stability of more quotations. A general similarity

between the wages of these and representatives of other building trades is demonstrable.

On the basis of our previous assumptions we may now determine with a fair degree of confidence the

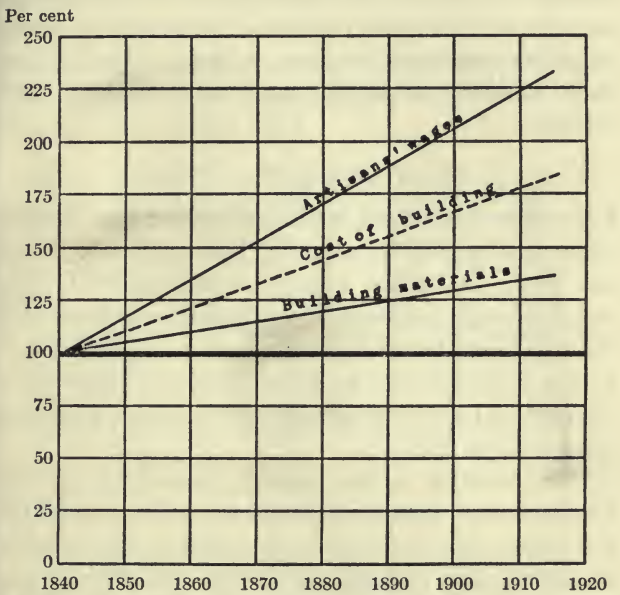

Diagram 26.—Trends of artisans' wages, the cost of building materials, and estimated cost of building, in per cents of the figures for 1841

trend of the cost of building, that is the cost of building the same kind of structure each year. A dotted line has been drawn in the diagram to indicate a trend halfway between that of building materials and wages. On this basis the cost of building shows

an increase over 75 years of 84 per cent, or something more than one per cent a year. The gradual character of this rise makes clear the reason why it has been possible to improve school construction so greatly without increasing the proportion of the school income devoted to that purpose. The teachers' salary curve has risen many times as fast as the building curve and total expenditures have risen faster than salaries.

Increases 1913 to 1920

For seven years past much more complete records are available as to the course of building costs. There are, in the first place, more complete figures for the trend of wages in the building trades to combine with the cost of materials in making up a building index. In the second place, we have for several important cities, detail as to the actual cost of school buildings from 1913 to 1919.

The *Monthly Labor Review*, published by the United States Bureau of Labor Statistics, carries for the more important cities throughout the country the union scale of wages in the building trades. For 10 cities the figures are complete from 1913 to 1919 for eight kinds of building artisans and three kinds of building laborers.[1] The average hourly wages in each of the trades have been computed for the 10 cities and have then been turned into per cents, taking as 100 per cent the averages for 1913. The resulting figures are given in Table 9. The 10 cities for which the quota-

[1] *Monthly Labor Review*, November, 1919.

tions were taken were Boston, Chicago, Cleveland, Kansas City (Missouri), Louisville, New York, Providence, San Francisco, Seattle, and Washington, D. C. The figures from which the table was computed show that artisans' wages are now moving close to the $1.00 an hour wage, which has been reached and exceeded in many cities. The range of the average wages in the different trades is small, less than 10 cents in 1919.

TABLE 9.—WAGES IN THE BUILDING TRADES, 1913 TO 1920, IN 10 CITIES, IN PER CENTS OF FIGURES FOR 1913

Wage Earners	1913	1914	1915	1916	1917	1918	1919	1920
Artisans								
Bricklayers	100	102	102	103	106	118	136	
Carpenters	100	103	105	107	115	126	159	
Cement Finishers	100	101	101	105	111	123	148	
Inside Wiremen	100	103	107	107	121	126	160	
Painters	100	103	104	108	113	130	163	
Plasterers	100	100	101	102	107	116	137	
Plumbers	100	102	102	104	108	122	141	
Struct. Iron Workers	100	103	104	104	113	129	151	
Average	100	102	103	105	112	124	149	182[1]
Laborers								
Building Laborers	100	102	102	103	118	143	183	
Plasterers Laborers	100	102	103	105	116	133	164	
Hod Carriers	100	101	104	105	118	139	177	
Average	100	102	103	104	117	138	175	240[1]
General Average	100	102	103	105	115	131	162	211[1]

[1] Estimated.

The percentage increase among the artisans into 1919 ranges from 36 to 63. The best paid artisans, plasterers and bricklayers, have received the smallest

relative increases. On the average the increase during the period is about 50 per cent, and is estimated at 82 per cent up to February, 1920. The laborers show a larger increase, ranging from 64 to 83 per cent, and

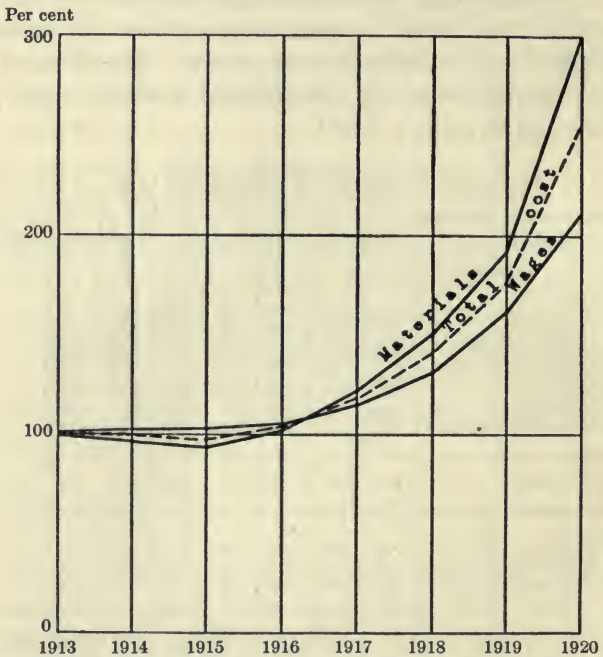

Diagram 27.—The cost of building materials, the wages of artisans and laborers, and the estimated cost of building each year from 1913 to 1920, in per cents of the figures for 1913

averaging 75 per cent into 1919, with a large additional increase in 1920. A general average for both into 1920 shows an increase of a little more than 100

per cent.[1] In taking this general average, the averages for artisans and laborers are given equal weights. The figures can now be plotted with the last part of the index of the cost of building materials of Diagram 25 turned into per cents of the 1913 figure. The two curves are shown together in Diagram 27. The dotted line for the total cost of building is plotted halfway between the wage and material curves. This brings the index in 1920 to a point approaching 260 per cent of the 1913 figure. The largest gain is made in the current year due largely to the jump in the price of building materials.

Actual Costs in Cleveland

During the seven years from 1913 to 1919 the city of Cleveland built 22 school buildings. The school architect, Mr. W. R. McCornack, has prepared tables showing the cost of each of these buildings under seven main divisions: masonry, finish, iron and steel, plaster, heating, plumbing, and wiring. The number of cubic feet in each building and the total cost per cubic foot were also computed. These figures give a basis for a direct index number of actual increase in the cost of school buildings in a large American city in the past seven years. This number measures not alone labor and material costs but differences in expense due to changes in construction.

[1] The increases shown in Table 9 are based on hourly wages. In many cases the hours per week have been considerably reduced. Hence the percentages shown here are not a true index of total wages received by each worker. They are a correct basis for estimating increased building costs.

To bring all the figures on a comparable basis the cost per cubic foot of the buildings constructed each year has been computed under the seven divisions. The resulting figures are given in Table 10 in cents. The cost of masonry shown in the first line increased from 8 cents per cubic foot of building in 1913 to 19 cents in 1919. Masonry is the largest item, finish and heating coming next. The total cost per cubic foot is shown at the foot of the table. It has risen from 17 cents in 1913 to nearly 54 cents in 1919, an increase of more than 200 per cent. The masonry alone in 1919 cost more than the entire building in 1913.

TABLE 10.—COST IN CENTS PER CUBIC FOOT OF SCHOOL BUILDINGS CONSTRUCTED IN CLEVELAND. 1913 TO 1919

Elements	1913	1914	1915	1916	1917	1918	1919
Masonry	8.1	8.1	8.7	11.1	13.5	15.0	19.4
Finish	3.0	3.2	4.5	7.1	7.7	9.2	11.6
Iron & Steel	1.3	.5	.9	1.6	1.8	2.3	1.7
Plaster	1.1	.8	.9	1.0	1.1	1.4	1.9
Heating	2.5	1.9	2.3	3.6	4.9	7.3	11.7
Plumbing	.9	1.2	1.3	2.0	2.6	4.2	5.1
Wiring	.2	.4	.6	1.4	1.0	1.2	2.0
Total	17.1	16.1	19.2	27.8	32.6	40.7	53.5

The relationships of the different main divisions of the cost are reproduced in Diagram 28. The different lines in the diagram show the cost per cubic foot of building of the main items from year to year. The cost of masonry in the construction of brick buildings is far and away the most important expenditure. Finish, which started in second position, has been passed by heating, the cost of which has climbed

more rapidly. Iron and steel shows the only decrease, due in some degree to the policy of constructing one story buildings. The cost of wiring which was in 1913 a small item has increased more rapidly than any other and in the past year has exceeded iron and steel and plaster in expense.

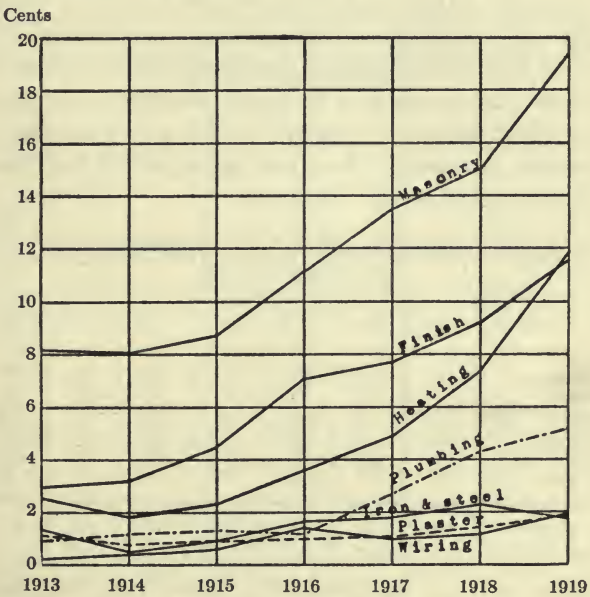

Diagram 28.—Cost per cubic foot of different elements of buildings constructed in Cleveland from 1913 to 1919

An Index of Cost Changes

The facts of the preceding table and diagram may conveniently be turned into the form of index num-

bers by computing each year's figures as per cents of the 1913 quotations. This procedure will indicate more clearly the relative changes which have taken place. It has been done in Table 11 which is based directly on Table 10.

The largest percentage increase is in wiring for which the 1919 cost is 10 times that in 1913. Plumbing and heating show the next highest increases. The three may be considered together as the mechanical trades. The other four divisions which we may group together under the term "building," show much smaller increases. The total figure for 1919 is three times as high as the 1913 cost.

TABLE 11.—COST PER CUBIC FOOT OF SCHOOL BUILDINGS CONSTRUCTED IN CLEVELAND, 1913 TO 1919, IN PER CENTS OF FIGURES FOR 1913

Elements	1913	1914	1915	1916	1917	1918	1919
Masonry	100	99	107	136	166	184	238
Finish	100	107	151	237	258	307	387
Iron & Steel	100	39	69	123	139	177	131
Plaster	100	73	82	91	100	127	173
Heating	100	76	92	144	196	292	468
Plumbing	100	133	144	222	289	467	567
Wiring	100	200	300	700	500	600	1000
Total	100	94	112	163	191	238	313

There are no statistics from other cities immediately available on exactly the same basis as the Cleveland data. There are, however, records from New York, Boston, and Chicago which make it clear that a 200 per cent increase in building costs is not peculiar to Cleveland, but is a general condition. Mr. C. B. J. Snyder, the architect of the New York

City Board of Education, has prepared a table showing the cost per cubic foot of the construction of different types of elementary school buildings in New York City according to bids submitted in succeeding months of the years 1919 and 1920. In Table 12

TABLE 12.—COST IN CENTS PER CUBIC FOOT OF GENERAL CONSTRUCTION OF ELEMENTARY SCHOOL BUILDINGS IN NEW YORK CITY ACCORDING TO LOWEST BIDS RECEIVED EACH MONTH IN 1919 AND 1920, AND PER CENT THESE COSTS WERE OF 1913 FIGURES [1]

Month	Cents per cubic foot	Per cent of 1913 costs[2]
1919		
February	37.2	186
March	33.6	168
April	37.4	187
May	39.5	198
June	....	...
July	42.5	213
August	44.9	225
September	42.2	211
October	48.1	241
November	....	...
December	48.3	242
1920		
January	56.0	280
February	58.4	292
March	59.0	295
April	65.0	325
May	71.0	355
June	73.0	365

[1] The figures cover building construction alone; not costs of heating, plumbing, and lighting plants, and furniture.

[2] 1913 costs are taken at 20 cents per cubic foot.

these figures are presented together with the percentage increase which they represent over 1913 costs on the basis of an average cost in 1913 of 20 cents per cubic foot. For purposes of this comparison all types of buildings, together with additions, are put together. The differences of type are only

sufficient to cause minor fluctuations in the figures. The increases from month to month are so marked as to eliminate minor differences. The only exceptions to a continuous increase were in February and September, 1919. In these cases the figures were affected by unusual circumstances as to amount or kind of excavation required.

If we compute from the Cleveland table of costs the increases in construction alone, omitting heating, plumbing, and lighting, we have a figure closely similar to those shown for New York. In 1913 the cost of building construction alone averaged 13.5 cents per cubic foot, and in 1919 had risen to 34.7. The percentage of 1919 costs to 1913 costs was 255. The difference between this percentage and the New York figure can be accounted for by differences in types of buildings and the fact that the Cleveland figures are affected by an expensive building contracted for on December 29, 1919.

The important fact about the New York City figures is that they substantiate in the main the Cleveland figures for 1919 and show for 1920 increases considerably ahead of the 1919 levels. In 1920 school buildings in New York City are costing three and one-half times as much as in 1913.

The data available from Boston, prepared by the Boston Schoolhouse Commission, are in the form of cost per classroom, and are only for the years 1916 and 1919. The figures are given in Table 13. They show the comparative cost per standard classroom of two similar 16 room buildings with assembly hall

erected in 1916 and December, 1919. The total cost shows an increase in this three year period of 140 per cent. This rate of increase is even somewhat greater than the rate for the same period in Cleveland. From 1916 to 1919 the increase in cost per cubic foot of building in Cleveland was 92 per cent. The cost per classroom cannot readily be computed on exactly the same basis as the Boston figures. Two somewhat similar Cleveland buildings erected in 1916 and 1919

TABLE 13.—COST PER UNIT CLASS ROOM OF A 16-ROOM ELEMENTARY SCHOOL IN BOSTON. 1916 AND DECEMBER, 1919

Elements	1916	December 1919	Per cent 1919 costs were of 1916 costs
Heating	$729	$1,575	216
Plumbing	345	563	163
Electrical	281	563	200
Building	6,770	16,793	248
Total	$8,125	$19,494	240

show an increase in the cost per classroom of 97 per cent. Cleveland costs for heating and plumbing rose more rapidly and costs for building less rapidly than in Boston. A part of the increases in Boston from 1916 to 1919 probably compensated for an earlier rise in Cleveland. In any case the Boston evidence supplements the New York data in demonstrating that the increases shown in Cleveland are in no sense unique.

There is evidence of a somewhat different character from Chicago. Mr. A. F. Hussander, architect of the

Chicago schools, has compiled a table showing the cost per cubic foot of a selected list of schools of similar types erected from 1913 to 1920. These selected schools show increases over 1913 costs of nearly 100 per cent in 1919 and 145 per cent in February, 1920. The increases are less than in other cities, particularly in the instance of one school contracted for in 1920.

The evidence from all four cities goes to indicate a greater increase in the cost of school buildings than is shown by the general index of the cost of building made up from the wages of workmen and the cost of building materials. This difference is quite understandable and may be attributed to a number of different factors. In the first place the dates under which the school buildings are listed are the dates of receiving bids or letting contracts. In all cases this is from one to two years earlier than the completion of the building. The contracts represent the best estimates of the contractors as to what wages and the cost of building materials will be in the coming year. The school house figures should therefore be compared with the general index numbers for building six months or a year later.

Further causes which are cited to account for high costs of schools are the margin which contractors must allow because of the uncertain market, the difficulties and increased expense of transportation, decreased efficiency of workmen, and changes in construction making for greater educational effectiveness.

These factors tending to increase costs have been

offset in no small measure, however, by very considerable building economies which have been introduced.

In Cleveland experimentation has been carried forward in a one-story type of building which saves enough corridor space and basement construction to cut the total cost per classroom about 25 per cent. In New York economies have taken the form of planning each building to reduce each feature to the minimum size, cutting down elaboration and ornament in design of exterior, the use of less expensive materials, permitting the contractor latitude in the choice of materials, and making drawings and specifications so explicit that no allowance would have to be made for uncertainty as to their meaning. Without these economies the figures shown in the preceding tables would have been considerably higher.

The building situation in 1920 may be summarized by saying that the general index of the cost of building is two and one-half times its pre-war level; and that in spite of considerable economies school buildings which anticipate the movements of the general index are actually costing fully three times as much as before the war.

Summary

1. Since 1890 building costs have absorbed from 16 to 19 per cent of all school expenditures.

2. Rising standards of building were for many years offset by low costs of building.

3. For 75 years, 1841 to 1915, the cost of building

increased about 84 per cent, or about one per cent a year.

4. From 1913 to 1919 the cost of city school buildings has risen about 150 per cent, or 25 per cent a year.

5. A level 200 per cent in advance of 1913 prices seems probable in 1920.

6. In the past few years rising standards of construction have gone with rapidly increasing building costs.

2. The wage of the common laborer is in the nature of a base pay upon which other wages are built.

3. Teachers' salaries are no exception to the general rule. In the past they have fluctuated with wages.

4. In particular teachers' salaries have followed closely the fluctuations of the wages of common labor and of artisans.

5. Since 1915 laborers' wages have increased about 100 per cent. Artisans' wages have risen nearly as high in proportion.

6. The cost of living has also risen about 100 per cent since 1915.

From these facts it seems clear that the pay of teachers and other school officers will tend to settle within the next year or two at a level 100 per cent higher than in 1915. It is equally clear that if such an adjustment does not occur the teacher will be in a less favorable position than workers in other occupations and the more able and ambitious workers will leave the profession.

These conclusions hold good for all types of school salaries and wages. The wages of the janitor are evidently determined by the wages of skilled and unskilled labor and his wages react rapidly to changes in their level. It is equally true that the salary of the superintendent is determined by the general salary levels which rest on the wage of common labor. And it is fully as necessary that his salary be changed to meet changing conditions. In fact it is even more necessary because the keenest competition for men in

business and professional life is the competition for leaders. If the schools are to secure and retain able leaders, the salaries paid must rise to meet new salary levels. To make the case more pointed, the city which paid its superintendent $10,000 before the war should now be paying $20,000 for the same kind of ability. The principal who did receive $4,000, should now receive $8,000. In discussions of salary schedules there should be as great care taken to ensure able leadership for the schools as to insure for the lowest paid teachers a reasonable standard of living. The discussion should center on how much the teacher is worth as compared with other workers, rather than on how little he or she requires for bare subsistence.

Governments are by nature slow in making adjustments to new conditions. They are dependent on the support of the people and they cannot act on any question until the majority of the people are ready to support action. Governmental expenditures are determined by annual budgets and annual levies of taxes. Income is dependent to a large degree on property, the value of which increases slowly. For these reasons the salaries of government workers lag behind other salaries in periods of rapid change. The result is that at times like the present, governments lose many of their most able employees. Since the armistice was signed on November 11, 1918, more than 2,000 regular Army officers have resigned their commissions to accept more lucrative positions in civil life. The number is nearly one-quarter of the total number of regular officers. Government de-

partments in Washington are finding it nearly impossible to hold their able men on the salaries they are authorized to pay. The number of applicants for positions as letter carrier in cities is, if a typical city district in New York be taken as an illustration, less than one-tenth as large as before the war.

As the largest group of civil servants in the country, teachers have been under the same handicap. The increases into 1920, of less than 50 per cent over pre-war salaries, have been only half as great as the increase in general wage levels. There can be no serious question that this lag has lost the schools of the country thousands of their more able teachers and has kept thousands from entering the teaching profession. This loss means lowered standards and a check to school progress. Every month that the scale of salaries in the teaching profession remains behind the general salary level, the situation is aggravated. What is required immediately is an increase which will bring teachers' salaries to a level approximately 100 per cent in advance of the level in 1915.

New Buildings

During the period of the war, school building was largely checked, particularly in cities. This is illustrated in Diagram 29, which shows the outlays for schools per capita of the population in cities over 30,000 for the two war years compared with 1915 and 1916. On this basis building in 1918 was cut down one-third as compared with 1915. The situation was, however, really worse than the diagram shows,

for a dollar spent for building in 1918 would buy only about two-thirds as much as in 1915.

While figures are not yet available for 1919 it seems

Diagram 29.—Outlays for schools for each inhabitant in cities of more than 30,000 population. 1915 to 1918

likely that they will still show the amounts spent for building considerably lower than in 1915. In the early spring of 1919, when building would naturally

have been resumed on a large scale, operations were delayed by a hesitancy to launch new undertakings without more assurance as to the stability of economic conditions. It was discovered then that bond issues for new buildings could not be floated on the former basis. Bonds issued at the old interest rates could be sold only at considerably under their par value. There was, moreover, a shortage of building materials. The schools therefore are entering the current year under-equipped with buildings. The construction of the next few years must be sufficient to make up this deficit as well as to provide for new increases of the school population and the replacement of old buildings now unfit for use. This heavy demand for new accommodations is accompanied by a cost of construction estimated in a previous chapter at three times the pre-war figures.

Other Expenditures

In the first chapter a diagram was inserted showing all expenditures in the schools of the country in 1918 and the percentage which each expenditure was of the total. The items mentioned, aside from salaries and outlays, are repeated in Table 14 for further analysis. With each item is shown the relation it bore to the total. The percentages are here shown worked out to one place of decimals, whereas in the first chapter they were rounded off.

It is possible to make rough estimates of the increases in cost of a number of these items. An article in the *School Board Journal* for December, 1919 gave cost

data for 1914 and November, 1919 on five standard textbooks published by five different publishers.[1] These books showed increases in price ranging from 12 to 27 per cent over the pre-war figures. The average was 20 per cent. This is probably too low an estimate of textbook cost in 1920, and certainly too low for 1921 and 1922. The wages of printers have practically doubled. The prices of paper and other materials are considerably more than double. These increased costs are being reflected in the price of textbooks as fast as the stringent laws controlling contracts for the purchase of school texts will permit. The expenditures listed under supplies are largely affected by the price of paper. It is to be anticipated that the item "textbooks and supplies" will be practically doubled.

TABLE 14.—SCHOOL EXPENDITURES IN THE UNITED STATES OTHER THAN SALARIES AND OUTLAYS. 1918

Object	Per cent of total
Fuel, water, light, etc.	7.8
Textbooks and supplies	3.0
Interest and fixed charges	2.8
Maintenance	2.7
Other	4.0
Total	20.3

An item of more importance is fuel, water, light, etc. Since fuel costs are in most cases back of the cost of water and light, the increases in fuel cost may be

[1] Dewey, Henry B.—The Cost of Textbooks. *School Board Journal*, LIX, 6, December, 1919, p. 26.

taken as a rough measure of the increases for the group. The Department of Labor index number for the price of coal shows an increase over the 1913 prices of from 61 to 63 per cent for different kinds up to January, 1920. It is probable that later prices will be higher rather than lower than this level.

The entry for maintenance is probably such a mixture of wages and materials as would be found in repairs of different kinds. The increases will be not unlike those in building, possibly not quite so high.

The items of fixed charges and interest are, we may assume, changed very little from the 1918 level. The other items are too small or indeterminate to permit an estimate.

A Summary Estimate

The various factors are now sufficiently in hand to make possible a reasonable estimate of the increase of the entire school budget. Suppose we assume that in 1914 or 1915 school expenditures were divided in the average community as they were for the entire country in 1918, the first year for which detailed figures are available. We can then say that each $1,000 of school funds was distributed as in the first column of Table 15. It is possible to indicate in the next column how many times the cost of each principal item must be multiplied to give the 1920 figure. The third column gives the cost in 1920 of the same items which cost $1,000 in 1915.

The total indicates that the same items of school expenditure will cost roughly twice as much in 1920

as in 1915. It should be noted that this figure does not allow for any increase in school efficiency, or in school accommodations. It is the sum required to buy the same kind and quantity of education the schools offered in 1915. The budget is conservative in many ways. The outlay figures take practically no account of the building deficit now being faced; the fuel figures do not allow for future increases; the interest figures do not provide for the higher interest rate necessary on new bonds; no increase is made in the "other" item because of lack of detailed information. The estimate is thoroughly conservative.

TABLE 15.—SCHOOL COSTS IN 1920 FOR EACH $1,000 SPENT IN 1915

Object	1915	Ratio	1920
Salaries and wages	$642	2	$1,284
Outlays	155	3	465
Fuel, water, and light	78	1.6	125
Textbooks and supplies	30	2	60
Interest and fixed charges	28	1	28
Maintenance	27	2	54
Other	40	1	40
Total	$1,000		$2,056

Will Prices and Wages Fall?

Retail prices reached their peak at the time of the Civil War just as hostilities were drawing to a close. They fell off a little in the next three years and then receded somewhat more rapidly. They did not reach the pre-war level, however, until at least 15 years after the war. The situation was in several respects

favorable to a reduction of price levels. New land was being opened up. Manufacturing was undergoing rapid development. The industrial organization was not complicated and a few years of production counted more in meeting needs than they do today. On the other hand, the economic life of the South had been broken down and four years of war had changed the currents of business in the North.

On these and other points it is possible to find similarities and dissimilarities between the situation then and now. The trend of prices depends on so many factors that it is practically impossible to secure all of the facts for a safe generalization. Probably the most reasonable argument for a similarity between the action of prices then and now is based on a neglect of the more incidental factors, many of which offset each other, and a closer attention to the more general aspects of the price movement. There was in both cases a rapid rise in prices brought about by the artificial conditions of war—conditions which included expanded currency and increased demands. When the artificial conditions are withdrawn the movement tends to subside. Operating against this tendency today there is a world demand for many American products, a scarcity of labor, and business prosperity.

In the face of these facts it would not seem wise to forecast any rapid change in price levels. There are some indications in the curve for retail prices that we are reaching the high point. In other curves, such as that for building materials, the most recent increases

have been the largest. It would seem on the whole wise to expect some lowering of price levels within the next few years, but no return to pre-war conditions for many years, if at all.

The case of wages and salaries is much clearer. After the Civil War some wages receded a little but only after several years. In fact during the entire 80 year period for which we have figures there was never any considerable lowering of either wage or salary levels. It may be said with substantial truth that wages and salaries retain advances made. At present it is reasonably certain that a new salary level has been reached which is likely to be permanent. The experience of the past supports this reasoning, and today the factors making for the permanence of salary and wage increases are more powerful than ever before.

In the making of school budgets no immediate relief is to be anticipated from lower prices. There may be slight recessions, but, in general, a higher level of prices and wages has been reached. On that level the school budget is approximately twice its pre-war size.

Summary

1. It will be necessary to pay teachers and other school workers twice as much in 1920 as was paid in 1915 to secure the same grade of ability.

2. A 100 per cent increase is fully as necessary in the higher paid, as in the lower paid, positions.

3. The cost of school buildings is three times as

great as in 1915. There is a deficit in building accommodations.

4. It is estimated that text books and supplies and building maintenance will show increases of 100 per cent; and fuel, water, and light an increase of at least 60 per cent over 1915 prices.

5. To buy the same amounts of educational service in 1920 as in 1915 it will be necessary to double the school budget.

6. No large recessions in prices or wages are to be anticipated immediately. We are on a new level of expenditure.

CHAPTER VII

SOURCES OF INCOME

Nearly four-fifths of all school revenues are derived from local taxation. The report of the United States Commissioner of Education for the year 1918 gives the percentages for that year as shown in Table 16.

TABLE 16.—PER CENT OF SCHOOL REVENUE DERIVED FROM DIFFERENT SOURCES

Local taxes	78.8
State taxes	13.7
Permanent funds and lands	2.9
All other sources	4.6
Total	100.0

The proportion received from state taxes was less in 1918 than in 1915 and 1916. In fact there has been a tendency in the past 30 years, for which the figures are published in the reports of the Commissioner, for the state to contribute a constantly smaller share of the educational funds of the community. There was an important exception to this tendency between the years 1905 and 1915. During this period there was a distinct movement toward a larger contribution on the part of the state. The movement appears to have been interrupted in 1915. The problem of school

support continues to be in the main largely one of local finance.

The General Property Tax

The most important form of taxation in American communities is the general property tax. This is

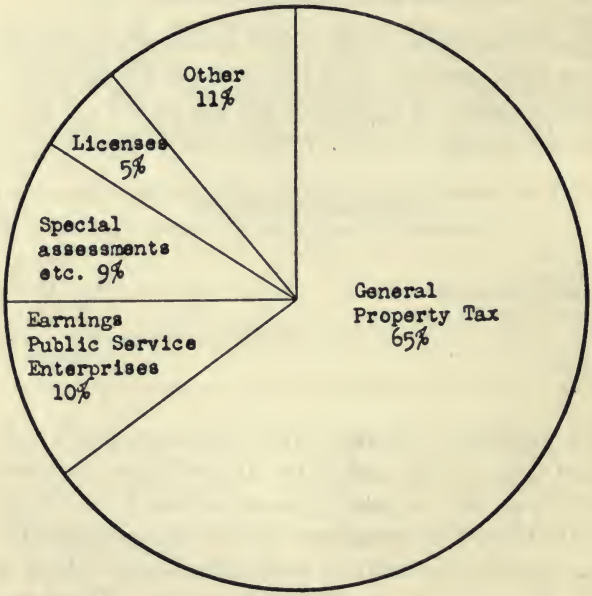

Diagram 30.—Sources of net revenue receipts of 146 cities in 1918

illustrated in Diagram 30 which shows what percentage of the revenue receipts of 146 cities of over 30,000 population was derived from different

sources.[1] The figures show that practically two-thirds of all revenue is from taxation on general property.[2] This tax is, moreover, the only important present local source of revenue which offers much room for expansion. License receipts will be greatly reduced this year. Earnings of public service enterprises cannot easily be increased against the present resistance to higher charges for this type of service. Special assessments are only available to pay for specific improvements. It would appear that under the present scheme of taxation increased school revenue must come largely from the general property tax.

School Costs Outstrip Property Values

In the surveys which the Department of Labor made last year of the living expenses of families it was found that amounts paid for rent had increased less than any other item of family expenditure. In November, 1919, they had increased on the average about 35 per cent over 1914 costs while other items of expenditure had increased by amounts ranging

[1] Bureau of the Census, *Financial Statistics of Cities*, 1918, p. 54. The figures for cities of over 30,000 population are the only ones available for local communities which are recent and reliable. The available evidence indicates that the procedure in raising funds in these cities may be taken as in general typical of methods in smaller cities and towns as well.

[2] In 1918 more than 50 per cent of all state revenues came from taxation of general property and in 1913, the most recent year for which the figures are available, 76 per cent of all county revenue was secured from a general property tax. Hence school funds from state and county sources depend in considerable measure on the general property tax.

from nearly twice to three times as much. This is a reflection of the slowness with which real estate values feel the effects of price changes. Real property, which today constitutes the bulk of taxable property,[1] is not a commodity which changes hands very often. It is affected but slowly by changing costs of construction. Its rental value is fixed for long periods by leases. For these reasons the value of property has advanced too slowly, during the past 40 years, to meet the demands now being made upon it in the way of increased tax requirements. Figures are available in the publications of the Bureau of the Census to show, for cities of over 30,000 population in 1900, the increases in property value and those in school expenditures during the past four decades. The records are complete for 40 cities representative of different parts of the country. The 40 include 10 eastern cities, 10 in the central states, 10 from the west, and 10 from the southern states.[2]

In the 40 cities, as shown in Table 17, the average

[1] In the United States as a whole the value of real estate constituted, at four periods of Census reports in 1880, 1890, 1902, and 1912, almost exactly 75 per cent of the assessed value of all property subject to ad valorem taxation. For cities of more than 30,000 population the proportion has run nearer 85 per cent.

[2] The cities are Hartford, Portland (Maine), Springfield (Mass.), Boston, Albany, New York, Philadelphia, Manchester, Jersey City, Pittsburg, Chicago, LaCrosse, Minneapolis, Grand Rapids, Cincinnati, St. Louis, Milwaukee, Indianapolis, Des Moines, Columbus (Ohio), Little Rock, Atlanta, New Orleans, Charleston, Nashville, San Antonio, Baltimore, Richmond, Louisville, Montgomery, Los Angeles, San Francisco, Sacramento, Oakland, Topeka, Lincoln, Omaha, Portland (Oregon), Salt Lake City, Denver.

expenditure for running expenses of schools in 1880 was about $2.00 per inhabitant. The average assessed value of property was something more than $500. Both property and school costs have increased rapidly since that year, but rather unevenly. School costs increased but little between 1880 and 1890; property showed a considerable advance. In the following decade the situation was reversed. From

TABLE 17.—ASSESSED VALUE OF PROPERTY AND CURRENT EXPENSES OF SCHOOLS PER INHABITANT IN 40 CITIES. 1880 TO 1918[1]

Year	Value of property	School costs[2]
1880	$529	$2.05
1890	632	2.33
1900	638	3.16
1910	824	4.33
1915	1015	5.40
1918	1021	6.27

[1] The averages used are unweighted by size of city. They express the practice of the typical city. A weighted average would in this case be unduly swayed by the influence of a few cities.

[2] The figures for school costs include only current expenses; they do not include expenditures for new buildings and equipment and interest. The inclusion of building costs would give unreliable results where it is not possible to include figures covering a large number of consecutive years.

1900 to 1915 the two increased approximately together. Between 1915 and 1918, however, school costs forged ahead while property was practically at a standstill. The stagnation of the assessed value of property was doubtless due in part to the reluctance of municipalities to assess on the basis of values

accrued during the emergency until there was more assurance that those values were permanent. On the other hand, the actual advance in property values was certainly slower than advances in other commodities.[1]

The significance of 40 years of change in school costs and property values is more clearly realized if we think of the relative growth of the two. This relative change is illustrated by Diagram 31 which gives the figures of Table 17 as percentages, taking as 100 per cent the levels for the year 1880. The white column in each pair shows the value of property, and the black column school costs. For every period since 1890, school costs have risen relatively faster than the assessed value of property. During the entire span of nearly 40 years school costs have tripled in amount while property values have doubled.

Still another way to illustrate the changes which have taken place is utilized in Diagram 32 which shows the average payment for schools for each $1,000 of assessed valuation of property in the 40 cities. School costs have been a constantly growing charge against property values. The amount for

[1] During the past 40 years the rising tax rate has had some influence in retarding the growth of land values, as a rising tax rate means a reduction of net rent and hence of capitalized value. Retardation from this cause would not affect the capacity of the land to produce taxes. The increase in tax rates has been so small, however, that it has had no large influence on the lag in property values. The principal factor operating has been the slowness of property values to respond to the mounting value of the dollar and the rising interest rate.

1918 is more than half again as large as in 1880. If school costs should continue to increase faster than

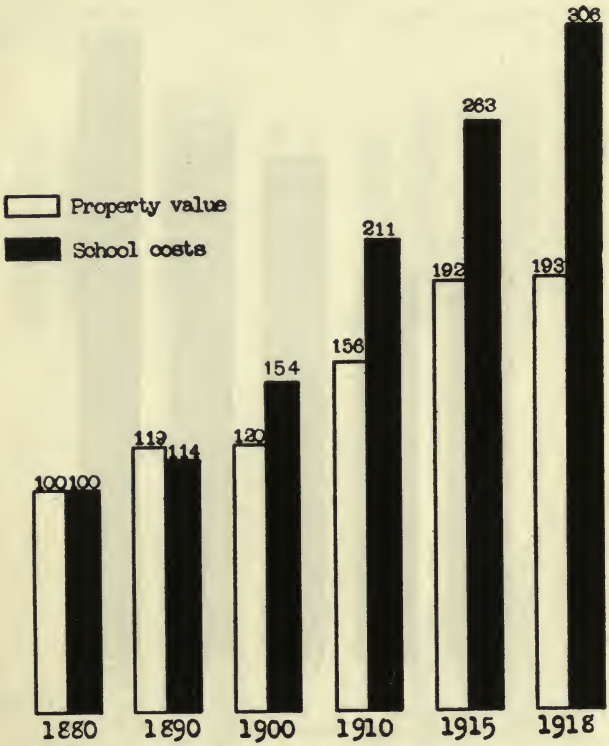

Diagram 31.—Assessed value of property and school current expenditures for each inhabitant in 40 cities from 1880 to 1918 in per cents of 1880 levels

property values, and if school needs should continue to be met largely by the property tax, there would

come a time when schools required the entire rental value of the property of a community.

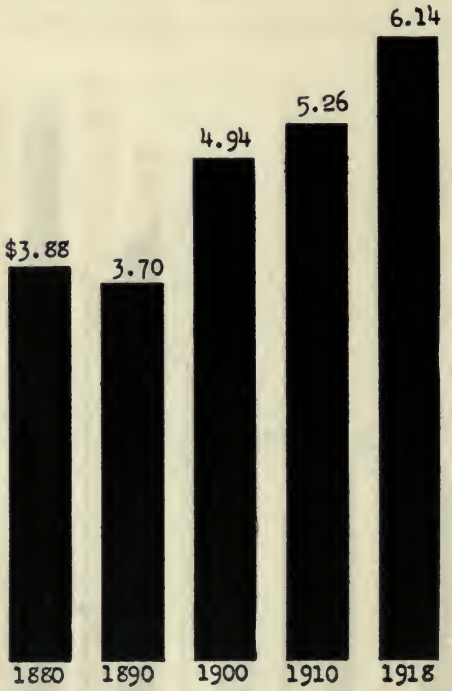

Diagram 32.—School costs for each $1,000 of assessed value of property in 40 cities. 1880 to 1918

Keeping Down the Tax Rate

Various methods have been found so that the increase in school costs would not result wholly in increased tax rates. The assessment ratio has been

raised so that property is assessed at nearer to its true value. Other expenditures have been kept down so

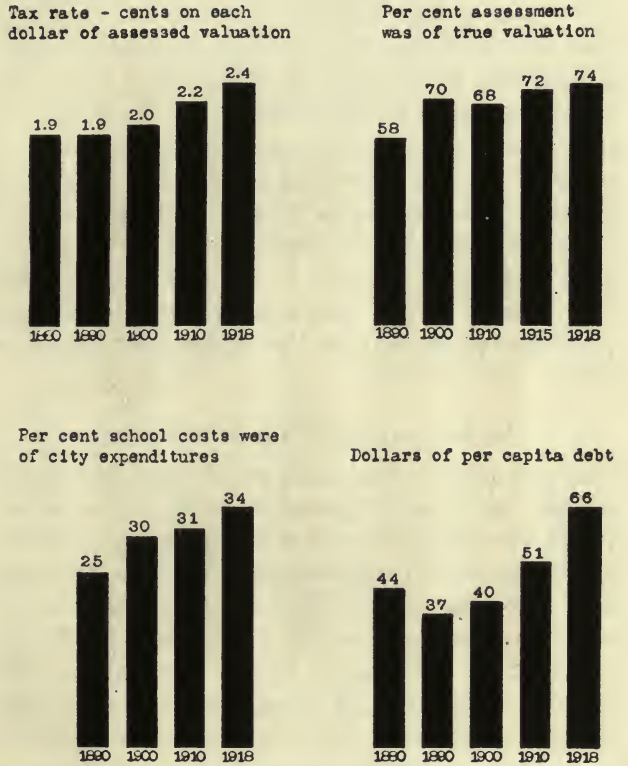

Diagram 33.—Methods of meeting advancing municipal costs in 40 cities

that school costs have become a larger percentage of total municipal current expenditures. New buildings

and highways have been paid for by the sale of bonds so that the municipal debt has been greatly increased. The increases in 40 cities in these respects are shown in Diagram 33.[1] The city tax rate[2] has been increased only from 1.9 cents to 2.4 cents on a dollar. The real increase is considerably larger because, according to the estimates of the Bureau of the Census, the ratio of assessment to true value of property has been increased from 58 per cent to 74 per cent. The per capita debt in 1880 still reflected Civil War finances. It reached its lowest point in 1890 at $37 per person. It has now risen to $66. The interest on this debt amounts to a larger sum per person each year than the total cost for schools in 1880.

An Increasing Share for Schools

The proportion school costs are of total city expenditures for current expenses is worthy of more detailed comment. Education has for many years involved the largest single expenditure made by cities. The percentages which go to different objects are shown in Diagram 34, which is taken from the *Financial Statistics of Cities* for 1918.[3] The figures differ slightly from those of Diagram 33 because the average is weighted. The expenditures for education

[1] The figures of Diagram 33, like the earlier figures of this chapter, are unweighted averages which give typical city procedures rather than the procedure for all cities.

[2] The diagram shows the tax rate for city purposes, not including state and county taxes.

[3] Page 87.

are three times as large as any other single expenditure. In the past 15 years four of the items have decreased in relative importance and four have increased. The four which have decreased in their relation to the total are the police department, general government, highways, and fire department.

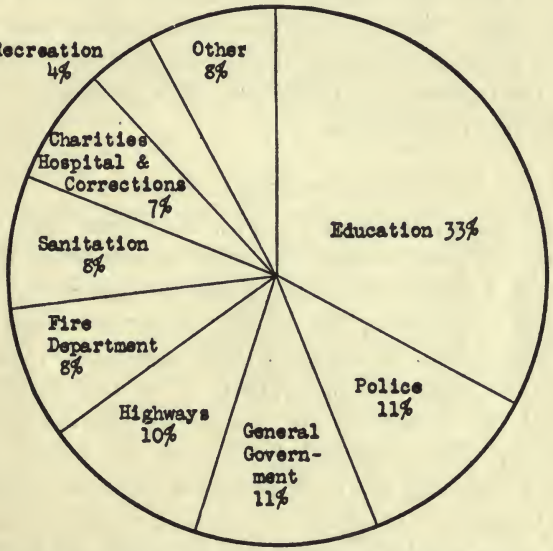

Diagram 34.—Departmental expenses of cities of more than 30,000 population in 1918

The four which have increased are all directly humanitarian in aim: education; sanitation; charities, hospitals, and corrections; and recreation. It is evidently the intention of the American people to expand the work of government in these directions.

The city is taking over functions which were formerly personal and individual. For these purposes, and especially for education, other expenses have been kept down, the tax rate has been increased, the assessment ratio raised, and heavy debts incurred. There are now distinct limits to further increases in city debts. The typical city is bonded nearly to the legal limit. With the increase in the general level of costs other city departments cannot give way further for the expansion of education. The problem is one of finding new revenue.

Sources of Increased Revenues

From the evidence of the past it is clear that the American people believe so firmly in education that they will furnish the funds which are necessary, not simply for keeping the schools on current levels of efficiency, but for ensuring their continuous expansion and improvement. There is no real question about the ability of the people to pay for good schools. The unsettled problem is the means by which the funds are to be provided. It is not within the purpose of this study to venture a prediction as to the exact methods which will be employed in the solution of the problem. In the opinion of the writer there are, however, certain general principles bearing on the solution which may appropriately be summarized.

The evidence introduced in the early part of this chapter makes it clear that in American cities during the past 40 years a tax known as the general property

tax, but based largely on real estate values, has been without any question the largest and most reliable source of revenue. It would appear to be the only local tax now used on a large scale which offers room for expansion. Any consideration of projects for increased revenue must begin by weighing the possibility of an increase in the property tax.

A tax which is based primarily on real estate values possesses certain virtues from the point of view of the theory of taxation. Real estate is tangible as is no other property. It is quite impossible to assess as equitably or collect as surely an income tax, or an excess profits tax. Land and buildings are constantly in public notice, and their true values are known through frequent transactions. No other tax has these advantages in so marked degree.

There are further advantages. Real property in a peculiar sense takes its value from the community. Land which is not agricultural or rich in minerals is not of value in itself. It is valuable because people are near it. In taxing real property, and particularly land, the public simply takes back some of the value which it has given. This attribute of real property has more than a theoretical bearing on the case. The fact that real property takes its value from the community causes its value to increase in a general way at the same pace as the needs of the community. With greatly enlarged wants in the last 50 years, this increase in the value of property has not kept pace, but the tendency is nevertheless present in large degree; and today, while property has lagged far be-

hind costs of commodities and wages in its increase in value there is evidence for believing that the difference will eventually largely be made up. Rents are now increasing at a rapid pace. The selling value of property, which reflects rental values, will follow their increase. Property values move more slowly than other values, but they do move with changes in the community and they move with great momentum. Even with present tax rates, larger revenues will be forthcoming from the general property tax because of increased values.

But there seems no good reason to believe that general property has been taxed all that it will bear. The best evidence on this score is the record of the actual tax rates which are in force in the cities of the United States. In the 226 cities of more than 30,000 population in 1918, the tax rates for all purposes, including state and county taxes, on the estimated true value of property ranged from nine mills to 3.4 cents on the dollar. In other words, some cities paid taxes nearly four times as heavy as others. A large number paid taxes at twice as high a rate as many others. If there were any definite economic limit to the burden which property would bear, it would be expected that tax rates would be grouped near that limit. This is not the case. The distribution of tax rates in 1918 shows two places on the scale where cities tend to group. A large number have tax rates from 14 to 17 mills, and another large number from 20 to 22 mills. There is no evidence of a limit which cities are approaching.

The city tax rates do not appear to be determined by the operation of economic laws. There is only a slight relationship between tax rates and wealth.[1] In a number of cases the rates are fixed by state laws. In most they seem to be determined largely by the customs and ideals of the people. The city and state which want to support schools will do so. The city and state which have real civic pride find it possible to tax themselves heavily for the common good.

The writer has not been able to discover a definite limitation in the way of a considerable increase of the tax on real estate, and especially on land in American communities. Such a tax appears fundamentally sound in theory. A still further reason for hope in increased revenue from this source is found in the improvement in recent years in the administration of property taxation. A stigma has become attached to the general property tax because that tax has included an assessment on intangible personal property. The tendency in recent years has been away from this element of the tax to such a degree that in recent years personal property values have constituted considerably less than one-fifth of all taxable property in American cities, and of this personal property a considerable part was tangible. The other great improvement of recent years in the administration of the property tax is in the method of

[1] Coefficients of correlation have been computed between a number of the different financial records of the 40 cities previously listed. These coefficients show no especially significant relationships between the different records.

assessing property. It may now be said that the technique of assessing real estate equitably has been mastered. A few years should see sound methods widely established.

For these various reasons the writer inclines towards the belief that taxation of real estate values, and especially of unoccupied land, will be a major source of enlarged school revenues for a number of years to come. Other forms of taxation will doubtless be utilized. The solutions reached by different states, cities, and towns will depend in some degree on local conditions. The one great certainty is that the American people will find the funds, not simply to restore the schools to their pre-war potency, but to make possible still more extended and more effective education.

Summary

1. Nearly four-fifths of school revenues are derived from local taxation.

2. Two-thirds of all city revenues come from the tax on general property values.

3. In the past 40 years in cities school costs have tripled in size while the assessed value of property has doubled.

4. To meet past advances in school and other municipal costs, tax rates have been raised, the assessment ratio increased, debts have been increased, and a larger percentage of all revenues devoted to school purposes.

5. Present needs cannot be met by adjustments in city budgets. They call for large additional revenue.

6. It seems probable that a tax on real estate values will furnish a large share of new revenue for schools.

7. The real estate tax is a sound method of taxation, and, in spite of large increases in the tax rate in recent years, there are no indications that the limit which real property can bear has been reached.

8. It is clear from the record of the past that the American people are so interested in education that in one way or another they will provide the funds to meet present school needs.

APPENDIX I

Method of Determining the Trend Line for Average Daily Attendance in All Public Schools From 1870 to 1918

Diagram 1 on page 16 shows in graphic form the number of children in average daily attendance in all public schools from 1870 to 1918. The original data are presented in Table 1. The problem is to determine the straight line which will most truly represent the trend of the irregular line for attendance data in the diagram. Since the data run by years, the slant of the trend line will be determined by a constant figure showing the amount that the trend line will move upward for each advancing year. This figure will be the coefficient of regression, which is the measure telling how much change takes place in one of two series of paired values for each change of one unit in the other series. If we arrange the data so that the first series is made up of the years, and the second series of the attendance figures, and call the deviations from the average in the first series x and those in the second series y, the formula which will give the coefficient of regression for the x series will be:

$$\text{Coefficient of regression} = \frac{\Sigma xy}{\Sigma x^2}$$

The coefficient is computed from the deviations of the separate measures of each series from their averages. The table giving the data on which these principles are to be applied begins as follows:

Year	Attendance
1870	4,077,347
1871	4,545,317
1872	4,658,844
1873	4,745,459
1874	5,050,840
1875	5,248,114

In carrying through the computations there are two rules which will greatly reduce the necessary work. The first is to convert the exact figures to round numbers, and the second is to subtract from the series the greatest number that it is possible to take away and still leave a remainder in the case of each number. In this case the original figures may be stated in terms of hundreds of thousands of children, and four million may be subtracted from every number. This will give us in the first year 100,000 children in excess of four million, 500,000 in the second year, 700,000 in the third year and so on. By observing this procedure the table may be rewritten, substituting for the dates the numbers 1, 2, 3, etc., to designate the first year of the series, the second year of the series, the third year of the series, and so on. The table as thus rewritten begins as follows:

Year	Attendance
1	1
2	5
3	7
4	7
5	11
6	12

To carry through the work indicated by the formula we now need to find the sum of the squares of the deviations of the first of these two series away from their average. The number will be the Σx^2 of the formula. This computation is simple. In any series of numbers the sum of the squares of the deviations from the average is equal to the sum of the squares of the numbers in the series minus the product of the total of the series and its average.[1] The first step is to find the sum of the squares of the numbers in the first series. In an unbroken series of natural numbers beginning with one, the sum of the squares of the numbers of the series is equal to

$$\frac{n\,(n+1)\,(2n+1)}{6}$$

[1] Ayres, Leonard P. A shorter method for computing the coefficient of correlation. *Journal of Educational Research*, April, 1920.

Since there are 49 years in this series, the sum of the squares of these 49 consecutive numbers is

$$\frac{49\ (50 \times 99)}{6} = 40425$$

The sum of a series of natural numbers beginning with one is

$$\frac{n\ (n+1)}{2}$$

or in this case

$$\frac{49 \times 50}{2} = 1225$$

The average of a series of 49 numbers beginning with one is the middle number or 25. Having these three numbers we may determine that in this series the sum of the squares of the deviations away from their average is

$$40425 - (1225 \times 25) = 40425 - 30625 = 9800$$

Similar methods are followed in finding the sum of the products of the deviations of the two series. The first step is to find the pair-products of the two series. This is done by direct multiplication and gives for the first part of the table the following results:

Year	Attendance	Pair-Products
1	1	1
2	5	10
3	7	21
4	7	28
5	11	55
6	12	72

The totals of the second and third columns are found by addition. The sum of the products of the deviations of the two series may now be found by subtracting from the sum of the pair-products of the original numbers the amount found by multiplying the sum of the second of the two original series by the average of the first. The average of the numbers in the first series is 25, the sum of those in the second series is 2615, and their product is 65,375. The sum of the pair-products is 87,766, which reduced by 65,375 leaves 22,391. This is the

Σxy of the formula. The coefficient of regression now becomes:

$$\frac{\Sigma xy}{\Sigma x^2} = \frac{22391}{9800} = 2.2847$$

Since the unit in which we are dealing is 100,000, this means that the general trend showed an increase in average daily attendance of 228,470 for each advancing year during the period.

The next problem is to find the location of this trend line now that we know its slant. This is determined by finding the average of the attendance figures, which in this case is 9,337,000, and which falls in the twenty-fifth year of the series, or 1894. By taking this number and this year as the pivot point, and using the constant of the coefficient of regression, one may readily find the point through which the line would run in any other year of the series.[1]

[1] Other details and applications of this method are explained in an article by Dr. Leonard P. Ayres in the *Journal of Educational Research* for May, 1920.

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VITA

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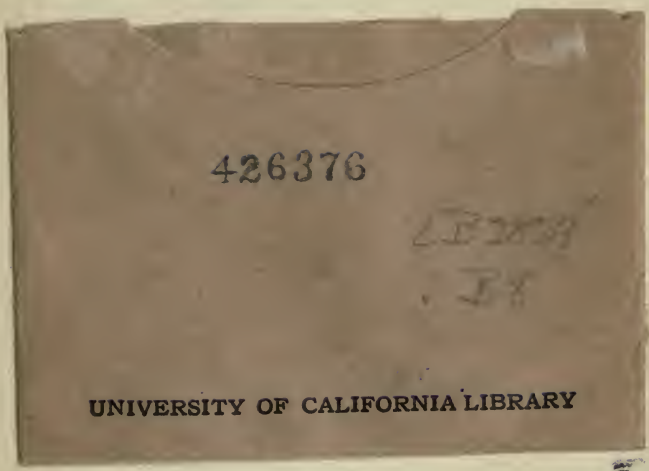

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